

AIR

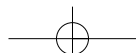
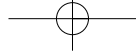
S E R I E S



User's Manual



dynaudioacoustics
IF IT'S THERE - YOU'LL KNOW IT




IMPORTANT SAFETY INSTRUCTIONS



The lightning flash with an arrowhead symbol within an equilateral triangle, is intended to alert the user to the presence of uninsulated "dangerous voltage" within the product's enclosure that may be of sufficient magnitude to constitute a risk of electric shock to persons.



The exclamation point within an equilateral triangle is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the product.

- 1 Read these instructions.
- 2 Keep these instructions.
- 3 Heed all warnings.
- 4 Follow all instructions.
- 5 Do not use this apparatus near water.
- 6 Clean only with a dry cloth.
- 7 Do not block any ventilation openings. Install in accordance with the manufacturer's instructions.
- 8 Do not install near any heat sources such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat.
- 9 Do not defeat the safety purpose of the polarized or grounding-type plug. A polarized plug has two blades with one wider than the other. A grounding type plug has two blades and a third grounding prong. The wide blade or the third prong are provided for your safety. If the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet.
- 10 Protect the power cord from being walked on or pinched particularly at plugs, convenience receptacles, and the point where they exit from the apparatus.
- 11 Only use attachments/accessories specified by the manufacturer.
- 12  Use only with the cart, stand, tripod, bracket, or table specified by the manufacturer, or sold with the apparatus. When a cart is used, use caution when moving the cart/apparatus combination to avoid injury from tip-over.
- 13 Unplug this apparatus during lightning storms or when unused for long periods of time.
- 14 Refer all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way, such as power-supply cord or plug is damaged, liquid has been spilled or objects have fallen into the apparatus, the apparatus has been exposed to rain or moisture, does not operate normally, or has been dropped.

Warning!

- To reduce the risk of fire or electrical shock, do not expose this equipment to dripping or splashing and ensure that no objects filled with liquids, such as vases, are placed on the equipment.
- This apparatus must be earthed.
- Use a three wire grounding type cord like the one supplied with the product.
- Be advised that different operating voltages require the use of different types of line cord and attachment plugs.
- Check the voltage in your area and use the correct type. See table below:

Voltage	Line plug according to standard.
110-125V	UL817 and CSA C22.2 no 42.
220-230V	CEE 7 page VII, SR section 107-2-D1/IEC 83 page C4.
240V	BS 1363 of 1984. Specification for 13A fused plugs and switched and un-switched socket outlets.

- This equipment should be installed near the socket outlet and disconnection of the device should be easily accessible.
- To completely disconnect from AC mains, disconnect the power supply cord from the AC receptable.
- The mains plug of the power supply shall remain readily operable.
- Do not install in a confined space.
- Do not open the unit - risk of electric shock inside.

Service

There are no user-serviceable parts inside. All service must be performed by qualified personnel.

EMC/EMI

This equipment has been tested and found to comply with the limits for a Class B Digital device, pursuant to part 15 of the FCC rules.

These limits are designed to provide reasonable protection against harmful interference in residential installations. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation.

If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on. The user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Caution:

You are cautioned that any change or modifications not expressly approved in this manual could void your authority to operate this equipment.

For the customers in Canada:

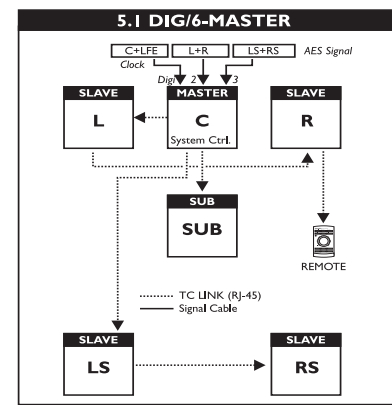
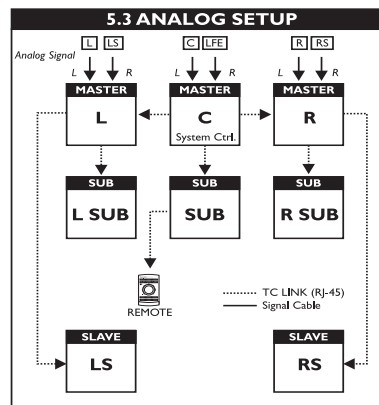
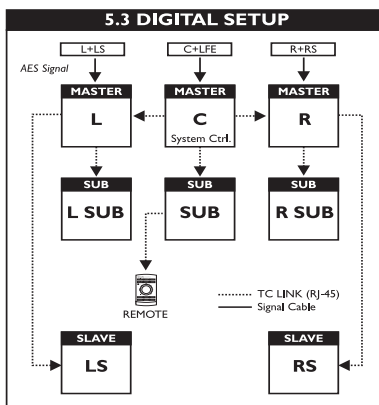
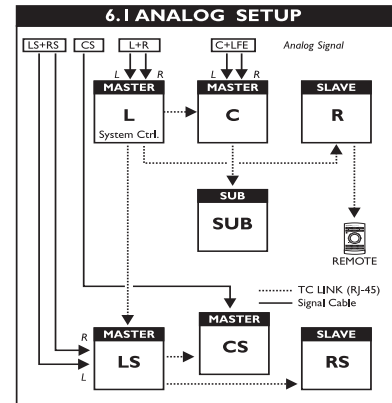
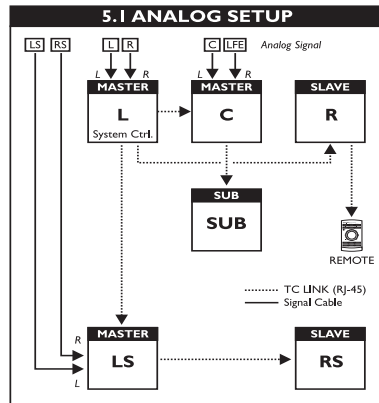
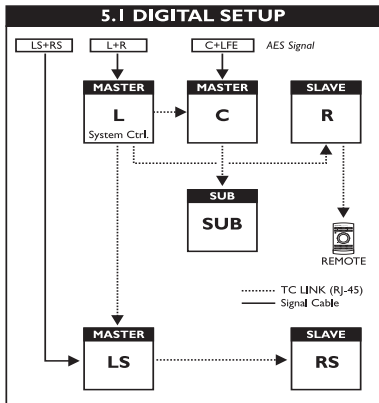
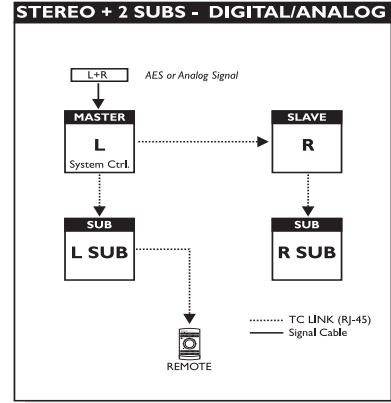
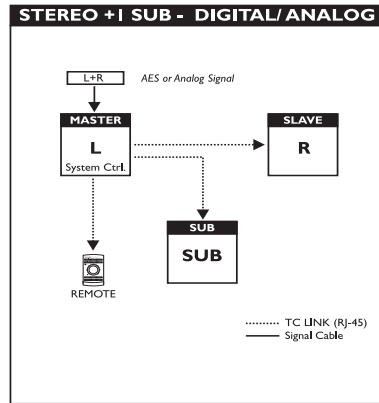
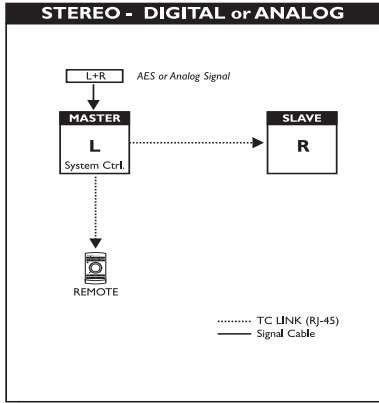
This Class B Digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations ICES-003.

Cet appareil numérique de la classe B respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

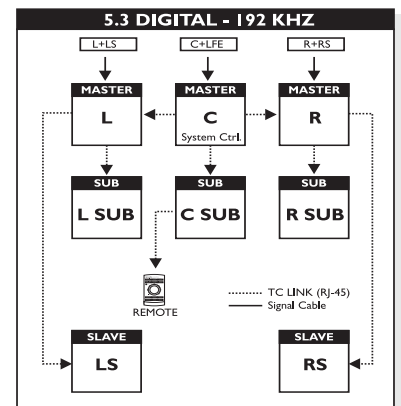
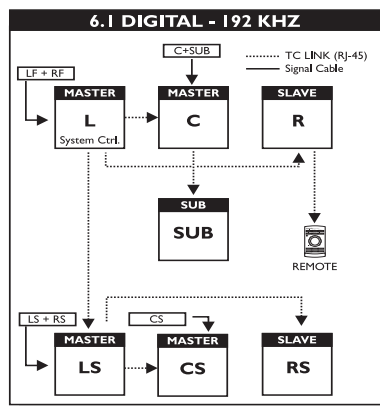
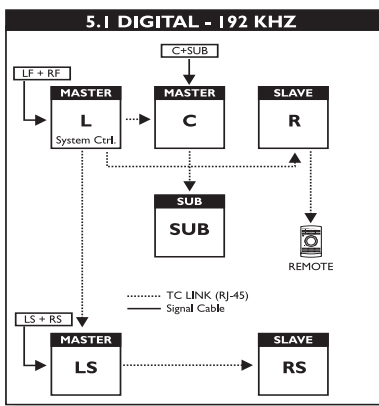
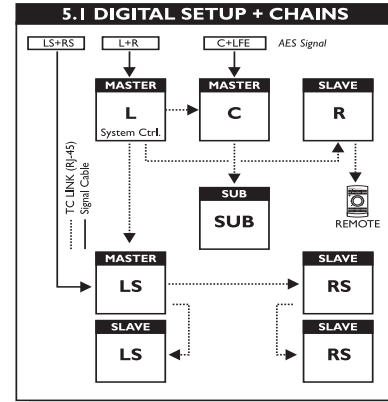
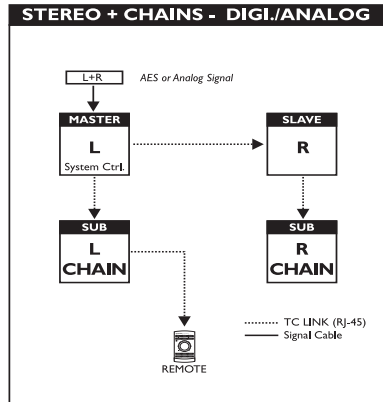
This Class B digital apparatus complies with Canadian ICES-003. Cet appareil numérique de la classe B est conforme à la norme NMB-003 du Canada.

QUICK SETUP REFERENCE

This page is a quick guide on how to connect different setups. Connections must be made exactly as illustrated. Detailed descriptions of the setups can be found on pages 8-16.



QUICK SETUP REFERENCE



Important !

- One **specific** Master monitor **must** be set as System Controller. (see setup illustrations above)
- To set a Master monitor as System Controller the TC LINK button on the rear panel must be left **out**.
- The TC LINK button on all other Master monitors must be set to **In** position.

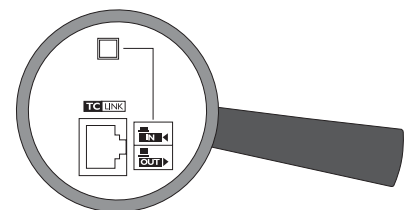


TABLE OF CONTENTS

Basics

<i>Important Safety Instructions</i>	a
<i>Quick Setup Reference</i>	b-c
<i>Table of Contents</i>	4

Introduction

<i>This Manual</i>	5
<i>The Product Concept</i>	5

System Description

<i>The Master/Slave Concept</i>	5
<i>The Master Unit</i>	6
<i>The Slave & Sub Units</i>	6
<i>Initializing Network</i>	6
<i>Remote Control</i>	6
<i>Common Features</i>	6
<i>Rear Panel Description</i>	7

Operation

<i>Operational Overview</i>	8
<i>The AIR Display</i>	9
<i>General Set-up Procedure</i>	9
<i>Setups</i>	10
<i>When the Monitors are Connected</i>	17
<i>Parameter Description</i>	18

Optimizing Your Setup

<i>Placing the Monitors</i>	20
<i>Checking Monitor Placement</i>	23
<i>Calibrating Main Monitors</i>	24
<i>X-Curves</i>	25
<i>Placing the Subwoofer</i>	26
<i>Checking Subwoofer Placement</i>	27
<i>Calibrating the subwoofer</i> <i>with the Main Monitors</i>	28
<i>Bass-management</i>	28

Background Information

<i>Acoustics</i>	30
<i>Sabines formula</i>	31
<i>Absorbers</i>	32
<i>Diffusers</i>	32

Standing waves

<i>Standing Waves</i>	33
<i>Room Modes</i>	34
<i>Comb Filtering</i>	37
<i>Rear Wall Cancellation</i>	39
<i>The Subwoofer</i>	40
<i>Bass Management</i>	40
<i>The LFE Channel</i>	41
<i>Delaying Monitors</i>	42
<i>Line Up & Calibration</i>	43
<i>How To Measure the Sound Pressure</i>	43

The AIR REMOTE

<i>Overview</i>	44
<i>Functions</i>	45

The AIR SOFT

<i>Setting up of the AIR SOFT</i>	46
<i>Operating AIR SOFT</i>	46

Appendix

Miscellaneous

<i>Miscellaneous Technical Comments</i>	51
<i>Reset procedure</i>	51
<i>Cables</i>	52

Technical Specifications

<i>Technical specifications for all models</i>	53
<i>Delay in System</i>	56
<i>Error messages</i>	56
<i>Certificate of Conformity</i>	57
<i>Preset list</i>	58

INTRODUCTION

This Manual

The latest manual revision is always available for download from www.dynaudioacoustics.com

The revision number of this manual is located at the bottom of page 4. Please compare to the revision number of the manual available for download from our web-site and download if newer.

Break in

Your AIR monitors must be "run in" before optimal performance is achieved. It is essential that the monitors are not run at full level until after at least 24 hours of moderate operation. Optimal performance is achieved after about one week of operation at moderate levels.

The Product Concept

The AIR monitor systems take a giant step forward in near-field monitoring and Dynaudio & TC Electronic are proud to present these systems. The AIR series include switch mode amplification and power-supply and with the addition of DSP and CPU, new possibilities are opened for easy, convenient and precise central control of both audio and setup-info.

The networking possibilities will fit nicely into today's applications and can be taken far into the future studio.

A brief overview of the new advantages with the concept:

- **System integration and networking (total recall, central control)**
- **Flexibility/adjustment possibilities (to the room, personal liking etc.)**
- **Extreme precision. (Precise alignment of individual monitors at the factory)**
- **Improved audio quality (from intelligent algorithms and precision filters)**
- **Direct Digital Reference (Digital Input)**

Both AIR 6 and AIR 15 are Pro Audio rear-ported near-field monitors and are excellent for both stereo and surround setups in applications such as Music Recording/Mixing, Post production, Film, Broadcast, Video-editing etc.

Extreme Precision

The frequency response and timing of the woofer- and tweeter signals of the AIR systems is controlled to a level of precision only practically obtainable with DSP. Furthermore the sensitivity of each individual loudspeaker driver is measured in the line of production, and deviations are compensated in the DSP software to 0.1dB steps. Perfectly aligned monitors also give the so far unseen advantage of interchangeability. In the unlikely case of a monitor breakdown, a perfectly matching monitor can be added instantly.

As most productions do end up in a digital format these days the AIR series allow monitoring of the "pure" Digital signal. Simply feed the monitors directly with an AES/EBU signal.

Having said that, many studios today are still working with

analog signals for monitoring - therefore an Analog Input option is also provided.

The following section is an introduction to the concept of the AIR systems. Detailed parameter explanations, setup guides and calibration info are to be found in later sections of this manual.

The Master/Slave Concept

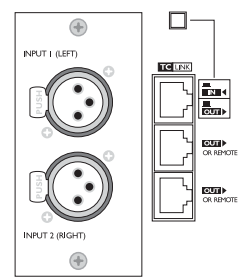
Two physically different units exist for each model.

A Master unit able to:

- receive digital audio on AES connections
- receive analog audio (if an analog option card is installed)
- send and receive audio and control data via the proprietary TC LINK connection.

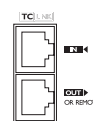
Master Monitor Rear

- To set a Master Monitor as System Controller the TC LINK button on the rear panel **must** be left out.



- One and **only** one of the Master units must be setup as the System Controller. This is done by leaving up the TC LINK button on the rear panel. (see above). Setting up a system is done from the System Controller monitor. You set up, set tasks and calibrate all connected monitors in the entire system from the System Controller.
- A Slave unit is able to receive and distribute audio and control data via the proprietary TC LINK connection.

Slave Monitor Rear



Audio signal from your studio is input to the Master monitors only and the signal is distributed from here to the connected Slave units through a proprietary Networking protocol. It is worth noticing that a Master monitor acts exactly as a Slave monitor when its TC LINK button is set in "IN position."

The networking capabilities, enables all monitors in a setup, no matter if it is Stereo or Surround, Digital or Analog to always be corresponding. This provides great possibilities in terms of general control of the entire system.

INTRODUCTION

The Master Unit

The Master unit distributes Audio and control data to the respective Slave units connected.

System Controller, Master or Slave

To set up a Master unit to be either System Controller or Master/Slave the LINK switch on the rear panel must be set up correctly.

Out:

The monitor operates as a System Controller

In:

The monitor operates as either:

- a regular Master with digital Inputs (analog Inputs are only with the optional analog I/O card installed) or
- as a Slave unit.

I/O

The Master unit contains AES/EBU Input connectors and three Link connectors carrying both audio and control data to connected Slave units.

Connectors

- 1* AES/EBU - XLR
- 2* Link RJ45 connectors
- 1* Link/Input RJ45 connector
- 1* Word Clock BNC sync

Option slot

Two card types are currently available.

- An analog Input module giving the option of feeding a Master unit with 2 analog Input signals.
- An AES Digital Input card giving the option of sending all six channels in a 5.1 setup to one single Master monitor. From there the signal is distributed to 4 slave monitors and Sub via the TC LINK RJ-45 connections creating a fully digital 5.1 setup.

The Slave & Sub Units

The Slave and Sub units contain one RJ45 Input connector and one Link connector. Via the RJ45 Input connector the Slave unit is supplied with audio and control data from the Master unit. Via the RJ45 Link connector transmission to additional monitors is possible.

Initializing Network

When the setup is powered up for the first time, the Master unit scans the setup in order to determine the number of monitors connected. Each monitor is recognized via a unique serial number but can be renamed according to task. After the initial scanning of the set-up, the Master unit will be re-scanning the setup every 5 seconds in order to determine any change.

Additional AIR Control units

Any additional Control units, such as the optional AIR Soft Remote or the AIR Remote, can be connected to any free "Link" connector in the system. (see below)

Control data is transmitted via the System Controller, and distributed to other monitors in the network.

Remote Control

AIR monitor systems can be set up and controlled locally via the Master monitor's user-interface via the optional remote control or from a PC/Mac.

AIR SOFT - Software Remote

Any parameter in the System Controller including the setup parameters can be controlled via the "AIR SOFT".

Additionally, software upgrades and installation of such can be done via AIR SOFT.

Hardware Remote

A simple remote level control, controlling the level of the entire set-up. Control data is transmitted to the Master unit, and distributed from there ensuring that any monitor hooked up, is set identically.

Air PC/IP

An optional software dedicated for the Advanced Installer. In addition to the common parameters the PC/IP software offers Parametric EQ and various Parameter Lock functions.

Common Features

- for both the Master and Slave units

Advanced Condition Monitoring

For both the Master and the Slave units several protection systems are included in the AIR monitors. This is to insure both short term protection against large dynamic pulse signals, but also to insure long term protection against over-heating and thus permanent damaging the drivers.

Long term thermal protection

Inside the amplifier module the temperature of the heat sink is constantly monitored so any dangerous over-temperature situations can be avoided - this is for protection of the entire electronic module. Furthermore the temperature of the tweeter voicecoil is calculated with behavioral modeling of the tweeters thermal characteristics.

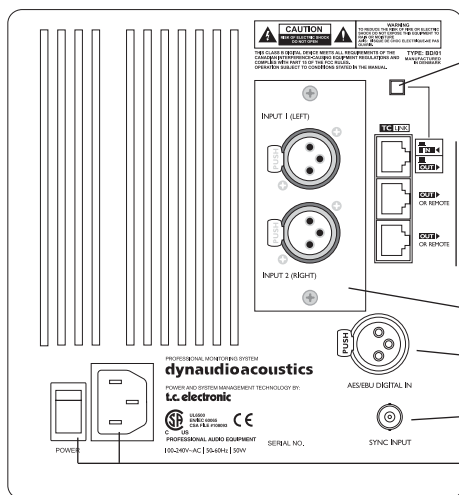
Beware

Power down procedure:

- In general, use the "sleep function" (Press and hold Exit on System controller),
- System will automatically go into sleep mode after 2.5 hours.
- If you need to switch the system off on the mains switch on rear panel, please make sure to turn down the global volume and switch Slave monitors off before Master monitors.

REAR PANEL DESCRIPTION - MASTER

Master Unit - Analog I/O



- **System Controller/Slave switch**
Out-position :The monitor operates as a System Controller



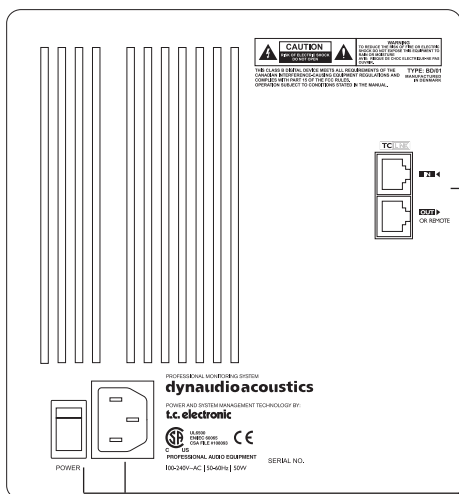
There can be only **one** System Controller in a setup.

In -position:

The monitor operates as either a regular Master or a Slave unit.

- **RJ45 Link connections for downstream Slave units**
- **Option slot with analog I/O card installed. (optional)**
- **AES/EBU digital Input**
- **Word Clock BNC sync**
- **Power Input 100-240V**
- **Power On/Off - switch**

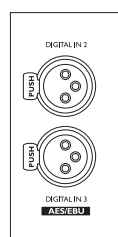
Slave/Sub



- **RJ45 Link connections for downstream Slave units**

- **Power Input 100-240V**
- **Power On/Off - switch**

Optional Digital I/O card

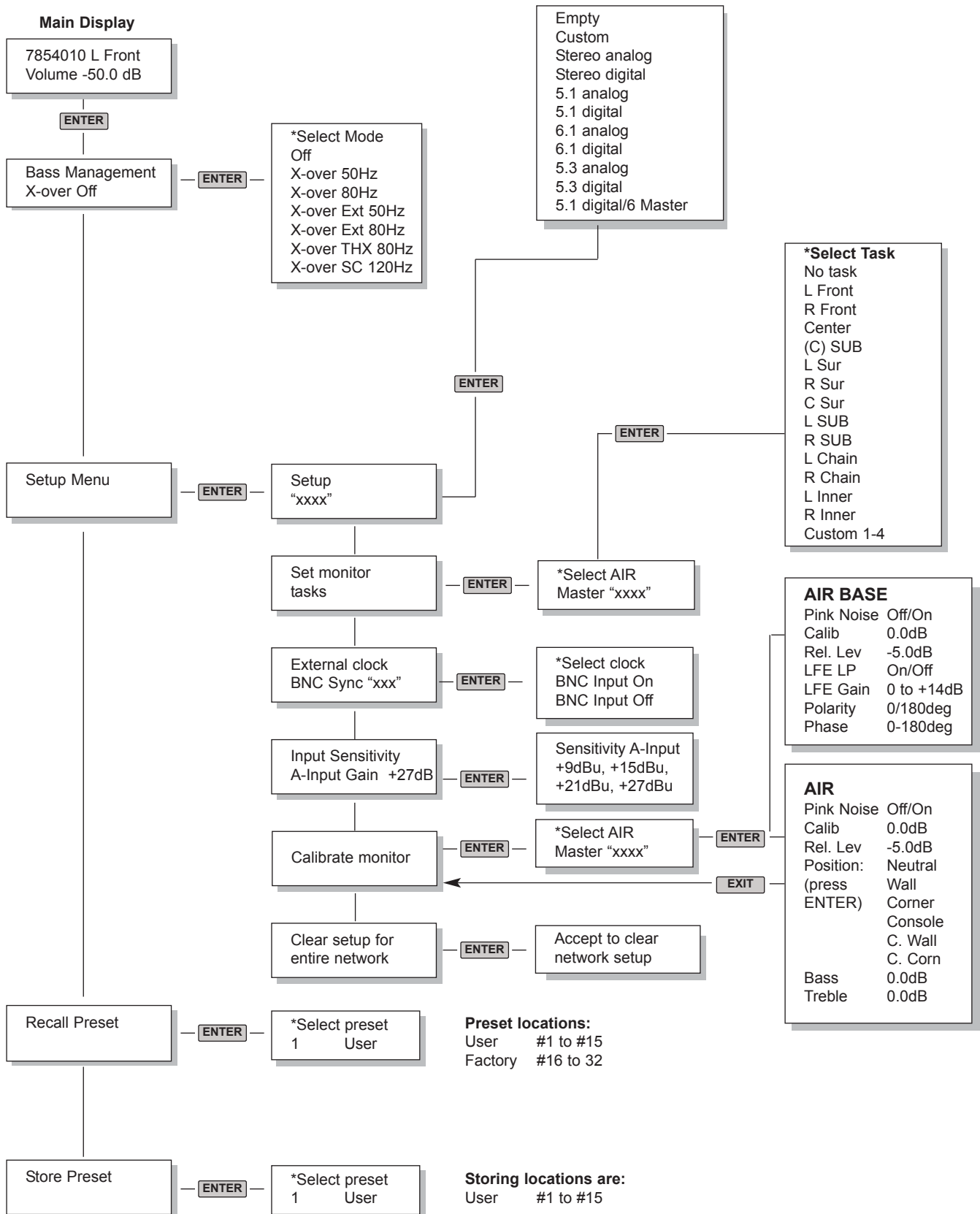


Optional Digital I/O card

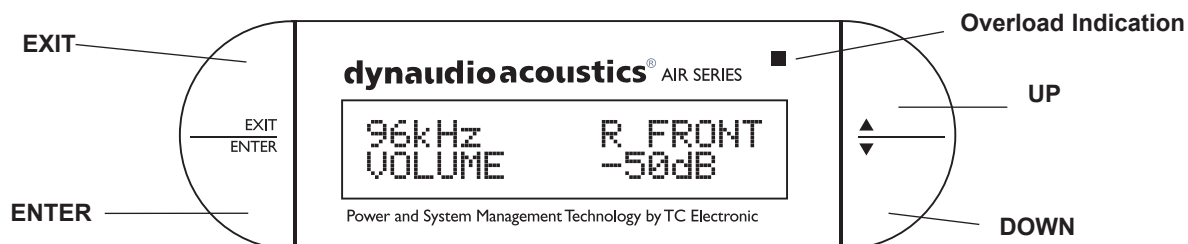
With this card installed in the Master Monitor option slot a 5.1 Digital/6 Master setup becomes an option. Three AES/EBU connections (6 channels) can then be fed to one Master monitor and distributed downstream. For further information see "Setups".

OPERATIONAL OVERVIEW

Parameter structure accessible via the AIR monitor set as System Controller



THE AIR DISPLAY & SETTING UP



ENTER key

The ENTER key has two main functions:

- To enter the menus currently displayed.
- To set the displayed parameter in Edit mode.

When a parameter can be edited via the CURSOR keys a "*" is set as the first character in front of the parameter.

EXIT key

The EXIT key is used to exit the current display and go to previous menu level.

CURSOR UP/DOWN keys

These keys are used for navigating and adjusting parameter values.

The previous page illustrates how to navigate through parameters using the AIR display.

Overload Indication LED

When this LED flashes the monitors built-in amp is driven beyond max performance. A continuous overload will activate the amp protection circuit and the monitor will be shut down. The monitor can be reactivated after a short period of cooling down.

This situation will NOT damage the monitor in any way.

Setting up - Introduction

To make your setup operate as intended correct cabling is **essential**. Choose one of the described setups and connect **exactly** as illustrated. The following section is a Quick-guide to get your system up and running. For instructions on how to place and calibrate monitors please read pages 17-39.

Setups including Subwoofer:

To activate the subwoofer, please choose an appropriate X-over frequency in the Bass Management menu. To read more about Bass management and subwoofer placement, please refer to page 24.

General Setup Procedure

- Decide which Setup you are going to build.
- Connect monitors exactly according to the illustrations on the following pages.
- Power up all monitors.
- Set one of the Master-monitors as System Controller according to the Setup illustrations. This is done by leaving the TC LINK button on the rear panel on OUT position.

• **NOTE: There can be only ONE System Controller in a setup.**

After "power-up" the System scans all connected monitors every 5 seconds.

Set tasks for all monitors via the System Controller unit via the following procedure:

- Enter Setup menu by pressing ENTER, ARROW DOWN, ENTER.
- Select the setup type you are using.
- Press ENTER again and the System will generate Pink Noise in one of the monitors.
- Select appropriate task for the monitor currently fed with Pink Noise using the ARROW keys and press ENTER to confirm.
- Continue allocating tasks for all monitors in the system.

Your monitor system is now set up ready for calibration and fine-tuning.

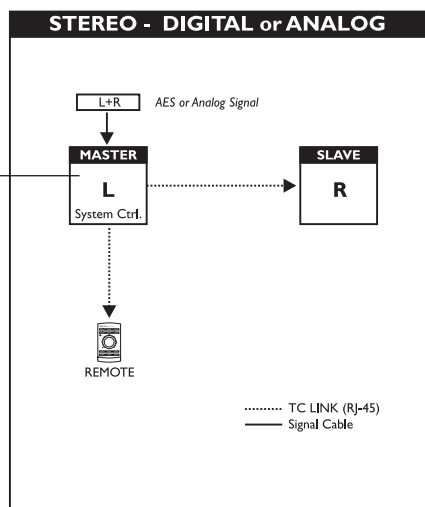
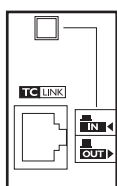
These procedures are described on pages 21-24.



The setups will ONLY operate correctly if connected according to the illustrations!

SETUPS

To set a Master monitor as System Controller the TC Link button on the rear panel **MUST** be in out-position.

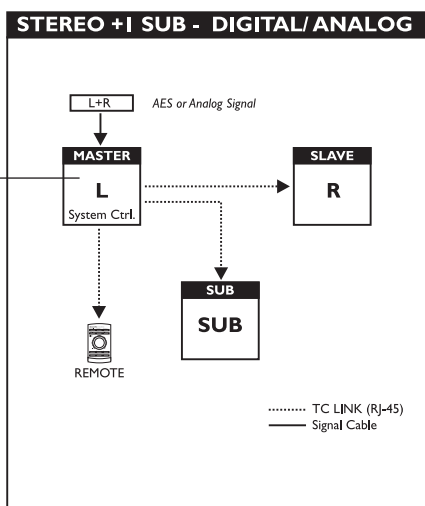
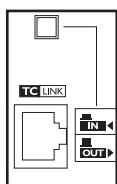


Stereo Setup

This illustration shows how to connect a standard stereo setup.

- Left monitor is set as System Controller by leaving out the TC Link button on the rear panel.
- Left monitor receives both Left and Right Input signal.
- Right monitor receives audio via the TC-LINK RJ-45 connection.
- The Remote and/or AIR Soft, can be connected to any available TC LINK Out connection.

To set a Master monitor as System Controller the TC Link button on the rear panel **MUST** be in out-position.

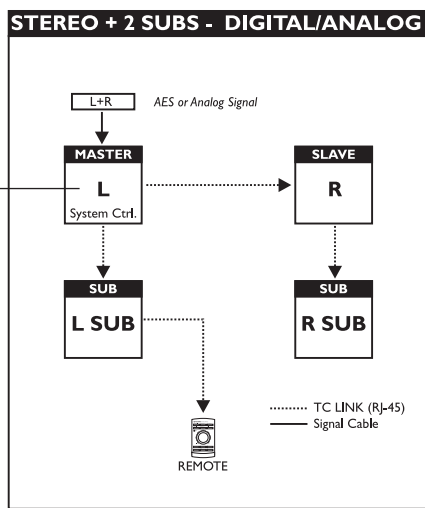
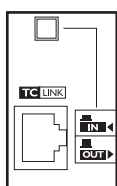


Stereo Setup with mono Sub(s)

This illustration shows how to connect a stereo setup with 1 Sub.

- Left monitor is set as System Controller by leaving out the TC Link button on the rear panel.
- Left monitor receives both Left and Right Input signal.
- Right monitor and Sub receives audio via the TC LINK RJ-45 connections on the Left monitor.
- With no Bass-management, no signal is sent to the Sub.
- With Bass-management activated, Low Frequency information from Left and Right channels below the set Cross-over frequency is extracted and fed to the Sub.
- The Remote and/or AIR Soft, can be connected to any available TC LINK Out connection.

To set a Master monitor as System Controller the TC Link button on the rear panel **MUST** be in out-position.



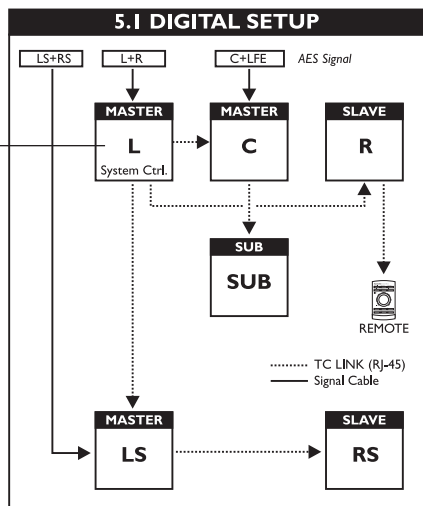
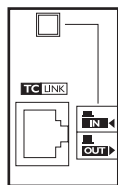
Stereo Setup with stereo Subs

This illustration shows how to connect a stereo setup with SUBs.

- Left monitor is set as System Controller by leaving out the TC Link button on the rear panel.
- Left monitor receives both Left and Right Input signal.
- Right Monitor and Subs receive audio via the TC LINK RJ-45 connection as illustrated.
- With no Bass-management, no signal is sent to the Sub.
- With Bass-management activated, Low Frequency information from Left and Right channels, below the set Cross-over frequency, is extracted. Low frequency information from the Left channel is distributed to L Sub and Low Frequency information from the Right channel is distributed to the Right Sub.
- The Remote and/or AIR Soft, can be connected to any available TC LINK Out connection.

SETUPS

To set a Master monitor as System Controller the TC Link button on the rear panel **MUST** be in out-position.

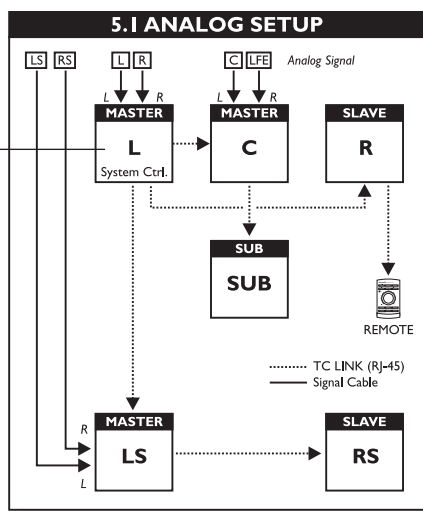
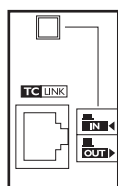


5.1 Digital Setup

This illustration shows how to connect a 5.1 digital setup

- Left monitor is set as System Controller by leaving out the TC Link button on the rear panel.
- Left monitor receives both Left and Right Input signal. Right channel is fed via the TC -LINK RJ-45 connection from the Left to Right.
- **LS** monitor receives both Left and Right Surround channels. The **RS** channel is fed via the RJ-45 connection from **LS** to **RS**.
- Center monitor receives both Center and LFE channels. The LFE monitor is fed via the RJ-45 connection from Center to LFE.
- The Remote and/or AIR Soft, can be connected to any available TC LINK Out connection.

To set a Master monitor as System Controller the TC Link button on the rear panel **MUST** be in out-position.



5.1 Analog Setup

This illustration shows how to connect a 5.1 analog setup

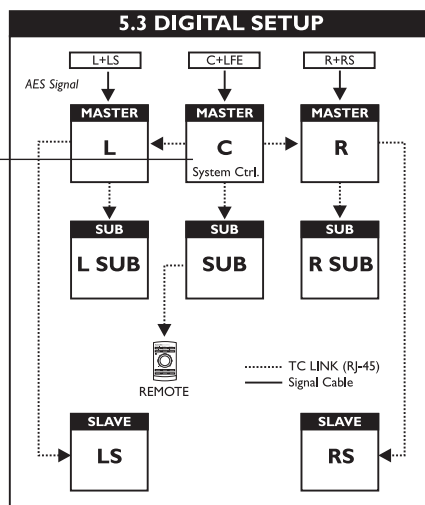
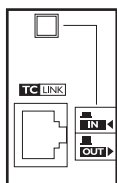
- Left monitor is set as System Controller by leaving out the TC Link button on the rear panel.
- Left monitor receives both Left and Right Input signal. Right channel is fed via the TC -LINK RJ-45 connection from the Left to Right.
- **LS** monitor receives both Left and Right Surround channels. The **RS** channel is fed via the RJ-45 connection from **LS** to **RS**.
- Center monitor receives both Center and LFE channels. The LFE monitor is fed via the RJ-45 connection from Center to LFE.
- With no Bass-management active the Sub will play only the LFE channel.
- With Bass-management activated Low Frequency information from the 5 main channels is extracted and distributed to the Sub where it is summed with the LFE channel.
- The Remote and/or AIR Soft, can be connected to any available TC LINK Out connection.



The setups will ONLY operate correctly if connected according to the illustrations!

SETUPS

To set a Master monitor as System Controller the TC Link button on the rear panel **MUST** be in out-position.

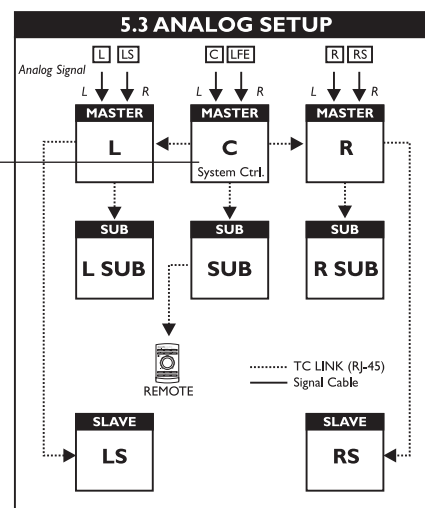
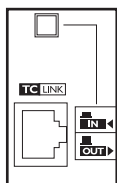


5.3 Digital Setup

This illustration shows how to connect a 5.3 Digital setup

- Center is set as System Controller by leaving out the TC Link button on the rear panel.
- Left monitor receives both Left and **LS** signal. The **LS** monitor is fed via the TC LINK RJ-45 connection from Left to **LS**.
- Center monitor receives both Center and LFE signal. The LFE monitor is fed via the TC LINK RJ-45 connection from Center to LFE.
- Right monitor receives both Right and **RS** signal. The **RS** monitor is fed via the TC LINK RJ-45 connection from Right to **RS**.
- With Bass-management "off" Left and Right Subs receives no signal.
- With Bass management "on":
 - Low frequency information from Left and LS is extracted and fed to Left Sub.
 - Low frequency information from Right and RS is extracted and fed to Right Sub.
 - Low frequency information from Center is extracted, summed with the LFE channel and fed to Center Sub.
- The Remote and/or AIR Soft, can be connected to any available TC LINK Out connection.

To set a Master monitor as System Controller the TC Link button on the rear panel **MUST** be in out-position.



5.3 Analog Setup

This illustration shows how to connect a 5.3 Analog setup.

Please see description on 5.3 Digital Setup above regarding Bass-management but notice how to connect the Analog signals:

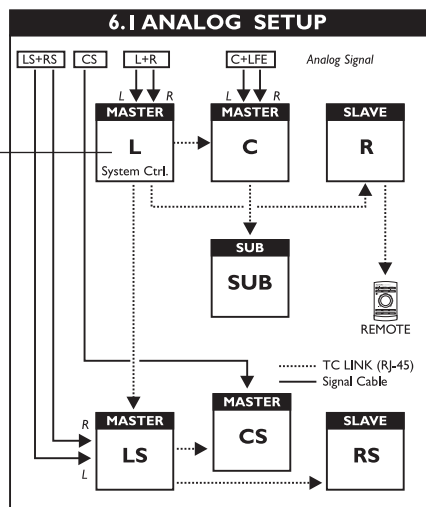
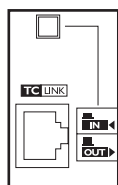
- Left channel to Left Input on the Left monitor.
- Left Surround channel to Right Input on the Left monitor.
- Center channel to the Left Input on the Center monitor.
- LFE channel to the Right Input on the Center monitor.
- Right channel to the Left Input on the Right monitor.
- Right Surround channel to Right Input on the Right monitor.
- The Remote and/or AIR Soft, can be connected to any available TC LINK Out connection.



The setups will **ONLY** operate correctly if connected according to the illustrations!

SETUPS

To set a Master monitor as System Controller the TC Link button on the rear panel **MUST** be in out-position.



Channels must be connected as follows:

- Left channel to Left Input on Left monitor.
- Right channel to Right Input on Left monitor.
- Center channel to Left Input on Center monitor.
- LFE channel to Right Input on Center monitor.
- Left Surround channel to Left Input on Left Surround monitor.
- Right Surround channel to Right Input on Left Surround monitor.

6.1 Analog Setup

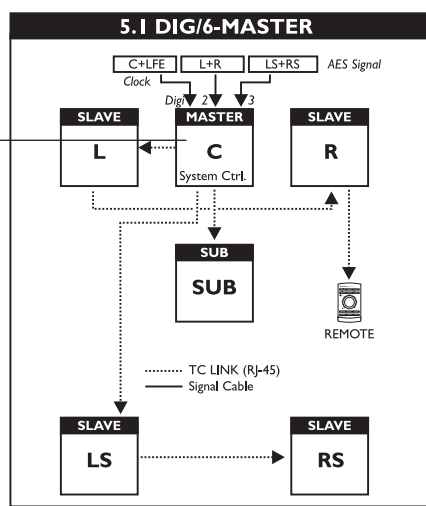
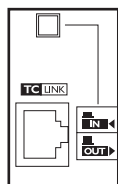
This illustration shows how to connect a 6.1 Analog setup

- Left is set as System Controller by leaving out the TC Link button on the rear panel.
- Left monitor receives both the Left and Right signal. The Right monitor is fed via the TC LINK RJ-45 connection from Left to Right.
- Center monitor receives both Center and LFE signal. The LFE monitor is fed via the TC LINK RJ-45 connection from Center to LFE.
- Left Surround monitor receives both **LS** and **RS** signal. The **RS** monitor is fed via the TC LINK RJ-45 connection from **LS** to **RS**.
- The Center Surround monitor receives only Center Surround signal.

- Center Chain: From software 1.10 it is possible to connect one or more Center Chain monitors.

- With Bass-management "off" only the LFE signal is fed to the Sub.
- With Bass-management activated, Low Frequency information below the set Cross-over frequency from the 5 main channels is extracted and distributed to the Sub where it is summed with the LFE channel.
- The Remote and/or AIR Soft, can be connected to any available TC LINK Out connection.

To set a Master monitor as System Controller the TC Link button on the rear panel **MUST** be in out-position.



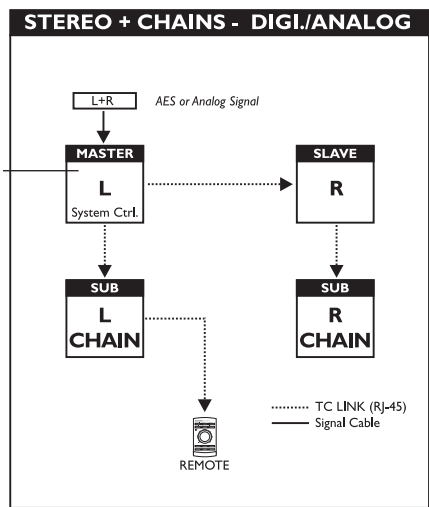
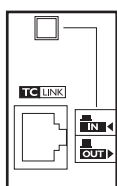
5.1 Dig/6 - Master

This is a 5.1 digital setup with Bass Management as an option. The setup requires one Master monitor with the optional Digital AES/EBU Input Card installed, four Slave monitors (or Masters set as Slave) and one Sub.

- Center monitor is set as System Controller by leaving out the TC Link button on the rear panel.
- Center monitor receives all 6 channels on the three AES/EBU connections.
 - Center and LFE on the monitors Digital IN connection.
 - Left and Right on the I/O cards Digital IN no. 2.
 - **LS** and **RS** on the I/O cards Digital IN no. 3.
- Right, Left, Sub, **LS** and **RS** receives signal via TC LINK RJ-45 connections from the Center Master monitor.
- Clock **MUST** be sent on the AES connection feeding Center/LFE channels (or on BNC).
- With Bass-management "off" only the LFE signal is fed to the Sub.
- With Bass-management activated, Low Frequency information below the set Cross-over frequency from the 5 main channels is extracted and distributed to the Sub where it is summed with the LFE channel.
- The Remote and/or AIR Soft, can be connected to any available TC LINK Out connection.

SETUPS

To set a Master monitor as System Controller the TC Link button on the rear panel **MUST** be in out-position.



Stereo Setup With Chains on L & R

This illustration shows how to connect a stereo setup with chains on Left and Right.

The chained monitors are fed with the same signal as the front L&R monitors. This the type of setup you would use when you wish to be able to alternate between a set of main- and nearfiels -monitors.

- Left monitor is set as System Controller by leaving out the TC Link button on the rear panel.
- Left monitor receives both Left and Right Input signal.
- Right monitor receives audio via the TC-LINK RJ-45 connection.
- The Remote and/or AIR Soft, can be connected to any available TC LINK Out connection.

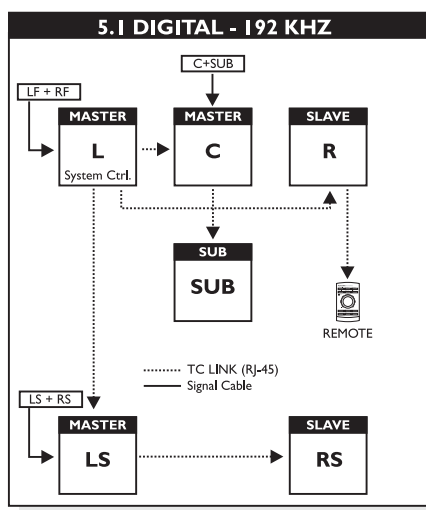
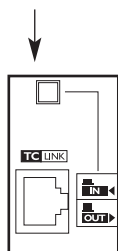
Other “Chained” Setups

From software 1.10 the available setups with “chain” option is: 5.1, 6.1 and 5.3 for analog and digital and well as 5.1/6 master (digital only).

The installed option card will limit the choices of setups presented on the speakers. If the AES/EBU option card is installed, the default digital Input will become Input 1 on the option card.

SETUPS

To set a Master monitor as System Controller the TC Link button on the rear panel **MUST** be in out-position.

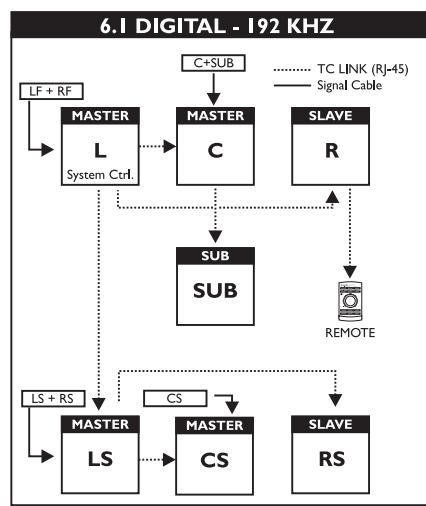
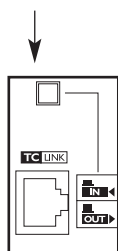


5.1 Digital - 192 kHz

This is a 5.1 digital setup at 192kHz with Bass Management as an option. The setup requires three Master monitors with the optional Digital I/O card installed, two Slaves and one Sub.

- Left monitor is set as System Controller by leaving out the TC Link button on the rear panel.
- - Left monitor receives Left and Right Front channels.
- - Center monitor receives Center channel and Sub.
- - Left Rear monitor receives **LS** and **RS** channels.
- The Sub receives signal via TC LINK RJ-45 connections from the Center Master monitor.
- Clock **MUST** be sent on the AES connection feeding Center/LFE channels (or on BNC).
- With Bass-management "off" only the LFE signal is fed to the Sub.
- With Bass-management activated, Low Frequency information below the set Cross-over frequency from the 5 main channels is extracted and distributed to the Sub where it is summed with the LFE channel.
- The Remote and/or AIR Soft, can be connected to any available TC LINK Out connection.

To set a Master monitor as System Controller the TC Link button on the rear panel **MUST** be in out-position.



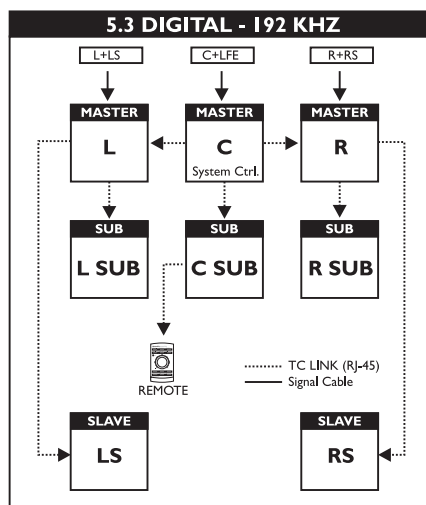
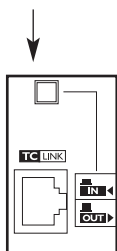
6.1 Digital - 192 kHz

This is a 6.1 digital setup with Bass Management as an option. The setup requires four Master monitors with the optional Digital I/O Card installed, two Slave monitors (or Masters set as Slave) and one Sub.

- Left monitor is set as System Controller by leaving out the TC Link button on the rear panel.
- - Left monitor receives both Left and Right Input signals.
- - Right monitor receives signal via the TC LINK cable.
- - Left Surround, receives both Left and Right surround signals.
- - Right Surround, receives signal via the TC LINK cable.
- - Center receives both Center and Sub signals.
- - The Sub receives signal via the TC LINK cable.
- - Center Surround receives Center Surround channel.
- Clock **MUST** be sent on the AES connection feeding Center/LFE channels (or on BNC).
- With Bass-management "off" only the LFE signal is fed to the Sub.
- With Bass-management activated, Low Frequency information below the set Cross-over frequency from the 6 main channels is extracted and distributed to the Sub where it is summed with the LFE channel.
- The Remote and/or AIR Soft, can be connected to any available TC LINK Out connection.

SETUPS

To set a Master monitor as System Controller the TC Link button on rear panel **MUST** be in out-position.



5.3 Digital Setup

This illustration shows how to connect a 5.3 Digital setup with Bass management as an option. The setup requires three Master monitors with the optional Digital AES/EBU I/O card installed, two Slave monitors (or Masters set as Slave) and three Subs.

- Center is set as System Controller by leaving out the TC Link button on the rear panel.
- Left monitor receives both Left and Left Surround signal. The **LS** monitor is fed via the TC LINK RJ-45 connection from Left to **LS**.
- Center monitor receives both Center and LFE signal. The LFE monitor is fed via the TC LINK RJ-45 connection from Center to LFE.
- Right monitor receives both Right and Right Surround signal. The **RS** monitor is fed via the TC LINK RJ-45 connection from Right to **RS**.
- With Bass-management "off" Left and Right Subs receives no signal.
- With Bass management "on":
 - Low frequency information from Left and **LS** is extracted and fed to Left Sub.
 - Low frequency information from Right and **RS** is extracted and fed to Right Sub.
 - Low frequency information from Center is extracted, summed with the LFE channel and fed to Center Sub.
- The Remote and/or AIR Soft, can be connected to any available TC LINK Out connection.

WHEN THE MONITORS ARE CONNECTED

This is a simple step by step setup guide

Overview

- 1 Connect the monitors
- 2 Set one Master monitor as System Controller
- 3 Turn down volume
- 4 Set Bass Management off
- 5 Select Set up menu
- 6 Clear entire network
- 7 Select set up (Stereo analog, 5.1 digital, etc)
- 8 Select monitor tasks (e.g. "L Front", "Center",
- 9 Set Clock Source

Connect the monitors

Power...
Audio...
Network...

Already at this point you must decide precisely what type of setup you are going to use. Connections must be done **exactly** according to the Setups illustrated on pages 10 to 13.

Set one monitor as System Controller

One specific Master monitor in the setup must be set as System Controller. This is done by leaving out the TC Link button on the back of the monitor. The Setup determines exactly which monitor this must be. (see pages 10-13).
All other Master monitors must be set to operate as "slaves" by leaving the TC LINK button in in-position.

Turn down volume

Before going any further select first item in main menu:

Volume

turn it down to: **-50 dBFS** (default setting on new monitors)

– this is just to prevent bad surprises.

Set Bass Management

Next point in the main menu is:

Bass management

select: **Off**

Note: In Stereo setups with subs, the subs will only play when Bass Management is set to "on".

Go to Setup menu

Move to: **Setup menu**
press: **ENTER**

Reset procedure

Select between following Reset options:

Reset all Settings

Hold ENTER when connecting Mains Power and select "Reset all Settings"
A "factory" reset procedure that deletes all global and local parameter settings as well as preset and network settings.

Clear entire network:

Select "Clear Entire Network" and press ENTER in the Setup menu.

Select Setup

Now you must define which kind of set up you have:

Empty
Custom
Stereo analog
Stereo digital
5.1 analog
5.1 digital
6.1 analog
6.1 digital
5.3 analog
5.3 digital
5.1 digital/6 Master
etc. etc.

Select monitor tasks

Now select first monitor and press ENTER
Pink Noise is generated in one of the monitors:

Set monitor tasks

(Pick matching task for the position of the monitor where Pink Noise appears. E.g. "Master L front",

press: **Exit**

External Source

BNC Input On:

The monitor attempts to lock on the Word Clock BNC connection.

BNC Input Off:

The monitor will attempt to lock on the AES Input.

PARAMETER DESCRIPTION

Basic operation in all menus

- Use ARROW keys to select value or submenu
- Use ENTER to enter menus or for confirmation, and to activate
- Use EXIT to step to a higher level or to decline an operation
- Values are marked with an " * " when they can be altered via the ARROW keys

Main Display

The Main Display indicates the position of the monitor (when set up) and the set volume for the monitor.

A "+" indicates that this specific Master Unit has been set up to act as System Controller.

Bass Management

Bass management is possible in:

- Standard Stereo with 1 Sub
- Standard Stereo with 2 Subs
- 5.1 Analog
- 5.3 Analog
- 6.1 Analog
- 6.1 Digital - at 192kHz
- 5.3 Digital
- 5.1 Digital/6 Master
- 5.1 Digital - at 192kHz

Satellite monitors uses 2'nd order Hi Pass filters to attenuate frequencies below the set Cross-over frequency. Subs use 4th order Low Pass filter to attenuate frequencies above the set Cross-over frequency.

- **Press ENTER to access the Select Mode**

Off:

Bass Management is not activated. Only the LFE channel is distributed to the Sub.

PCIP

Via Air PCIP (optional software for the advanced installer) and advanced Bass Management mode is available. In this mode all filters (Satellite, Sub4 and Sub2) can be controlled to suit demanding setups.

Cross-over frequencies:

Menu Name	Satellite filter	Sub 4'th order	Sub 2'th order	LFE = Sub
X-Over 50 Hz	50 Hz	50 Hz	50 Hz	No
X-Over 80 Hz	80 Hz	80Hz	80Hz	No
Extension 50 Hz	Off	50 Hz	50 Hz	No
Extension 80 Hz	Off	80 Hz	80 Hz	No
THX Sim 80 Hz	80 Hz	80 Hz	Off	Yes
THX Sim 120 Hz *	120 Hz	120 Hz	80Hz	Yes

Note that the Extension 50 and 80Hz uses no Bass Management on satellite speaker thus playing full range.

* Small Cons - Small Consumer

PARAMETER DESCRIPTION

Setup Menu

- Press ENTER to access sub-menus

Set Monitor Task

For the System Controller - Master monitor to identify and operate all monitors in the setup, each monitor must be given one of the following tasks indicating function and position.

- Press ENTER to access task options
- Use ARROW keys to select task
- Press ENTER to confirm selected task

Following tasks can be given:

No Task	C Sur	} Reserved for future use
L Front	L SUB	
R Front	R SUB	
Center	LS Chain	
(C) SUB	RS Chain	
L Sur	L Inner	
R Sur	R Inner	
	Custom 1-4	

Setup

- Press ENTER to enter select mode. Select mode is indicated by “ * ”
- Press ENTER to confirm choice

Empty:

No selection

Custom:

For future configuration -

Stereo analog:

Two monitor stereo setup with analog* Inputs selected.

Stereo Digital:

Two monitor stereo setup with digital Inputs selected.

5.1 Analog:

5.1 setup with analog* Inputs selected.

5.1 Digital

5.1 setup with digital Inputs selected.

6.1 Analog

5.1 Setup + Center surround on a separate channel gives the 6.1 setup.

6.1 Digital

5.1 Setup + Center surround on a separate channel gives the 6.1 setup.

5.3 Analog

Analog setup with 5 monitors and 3 subs

5.3 Digital

Digital setup with 5 monitors and 3 subs

* Analog Inputs are only available with an optional analog card installed.

5.1 Digital/6 Master

5.1 Setup using one Master with optional Digital I/o card installed, 4 slave monitors (or masters set as slave) and 1 sub.

External Clock

- Press ENTER to access sub-menus

BNC Sync On:

The monitor attempts to lock on the Word Clock BNC.

BNC Sync Off:

The monitor will attempt to lock on the AES Input.

Calibrate Monitor

- Press ENTER
- Select monitor to calibrate using the ARROW keys
- Press ENTER

PARAMETER DESCRIPTION

Parameters available for AIR 6 and AIR 15

Pink Noise:

Range: On/Off

Calibrate:

Range: -6dB to +6dB

Level calibration of the selected monitor.

Rel. Lev:

Range: -40dB to 0dB

Relative preset volume for the selected monitor.

Room Position:

Neutral

Wall

Corner

Console

C. Wall - Console Wall

C. Corn - Console Corner

Bass:

Range: -6dB to +6dB

Bass adjustment for the selected monitor

Treble:

Range: -6dB to +6dB

Treble adjustment for the selected monitor.

Parameters of AIR Base subwoofers

Pink Noise:

Range: On/Off

Calibrate:

Range: -18dB to +6dB

Level calibration of the selected monitor.

Rel. Lev. - (Relative Level):

Range: -40dB to 0dB

Preset volume for the selected monitor relative to the calibrated and global volume.

LFE Low Pass

Range: On/Off

Brickwall Limiter on the LFE channel attenuating frequencies above 120Hz.

LFE Gain

Range: -6 to +8dB

With this parameter you can boost the acoustic gain of the LFE channel.

Polarity

Range: 0 or 180°

If the Subwoofer is correctly placed, setting the Phase Reverse parameter at 180° should result in a full Phase cancellation at the set Cross-over frequency. If this is not the case - the Delay parameter should be adjusted.

Phase:

Range: 0-180°

To time-compensate if the Sub is not placed according to the ITU 775 recommendations. There are individual Phase settings for each of the Bass Management Cross-over frequencies. Once set, these are stored as Global settings.

Clear Setup for entire network

- Press ENTER and confirm with ENTER

LFE channel - note

Please note that in general the LFE channel should be mixed with +10dB headroom.

If you are not able to boost your LFE monitor output from your console, +10dB gain can be added on your AIR-Base input. Most format encoders / decoders take the LFE boost into account, meaning that you should leave the AIR-Base LFE gain at 0dB when playing back a DTS or DOLBY encoded material on your AIR system. LFE gain is set at 0dB in all factory presets, so if you need to add gain on your AIR Base please adjust this parameter and store the new setting in a user preset location.

Presets In General

A preset consists of the following settings:

- Preset Volume
- Mute status
- Bass Management
- X-curve setting
- LFE Low Pass
- LFE Gain
- Parametric EQ (can be adjusted the optional PC Installers Package only)

All other settings can be considered "global" and are not stored with presets.



With the optional AIR PC-IP installers software you can however create custom presets including global parameters.

Recall

- Press ENTER and use ARROW keys to select presets
 - Press ENTER to recall/load the selected preset
- If no user-preset are stored on locations 1 to 4, presets 16 to 19 are loaded instead.

Complete preset list is available in the appendix section.

Store

- Press ENTER and select storage location using the ARROW keys
 - Press ENTER again to store.
- Storage location can be 1-15.



Parameter can be locked via the Installers software. When trying to change values on a locked parameter the display reads "Locked".

PLACING THE MONITORS

This manual section is split into two. The first part is a direct guide on how to optimize your listening facilities to ensure optimal performance of your AIR monitor system. The second part contains In Depth explanations and background information of various acoustic phenomena's and is referred to on several occasions in the first chapter. To dive into this chapter and start optimizing your setup, it is essential that you have made proper connections for your AIR System. Please follow the illustrations in the "setups" section on pages 9 to 13.

Overview

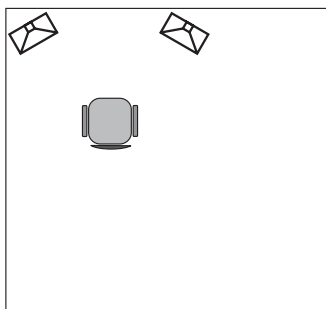
	Angle	Distance from listener
Left front	-30	Minimum 1 m
Right front	+30	Minimum 1 m
Centre	0	Same distance as L or R front 1)
Left surround	-110 +/-10	Same distance as L or R front 2)
Right surround	-110 +/-10	Same distance as L or R front 2)

In general: Symmetry

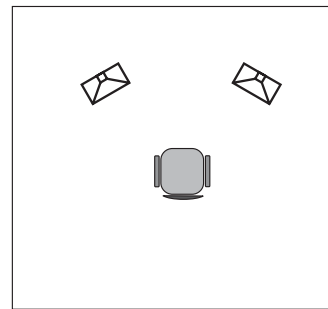
Basically it is preferred to establish a loudspeaker layout that provides an adequate and equal left/right image. The basis for this symmetry, meaning that the distance to the left and the right monitors is identical, and if not monitoring in the near field, then having identical distance to the (identical) side-walls.

The AIR System offer tools for compensation, but symmetry should be established whenever possible.

Not good !



Good !



Front monitors, left & right

For a proper stereo monitoring the monitors should be placed at an angle of $\pm 30^\circ$ in front of the listening position. This goes both for a basic stereo set-up and for the L&R front monitors in a 4 or 5 channel set-up.

Center front monitor

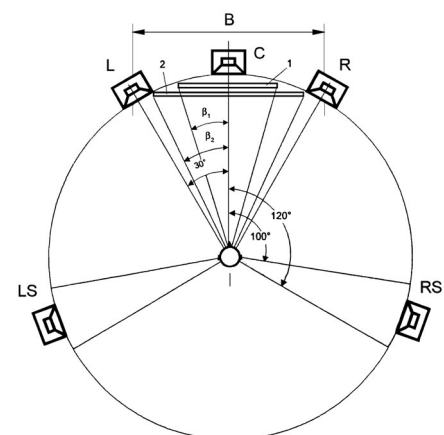
The center front loudspeaker can be placed either:

- A:** in the middle and in the same distance from the listening position as the left and right front monitors or
- B:** in the middle and on a straight line between the left and right front monitors.

Surround monitors, left and right

The surround monitors should be placed at an angle of ± 110 (± 10) and in the same distance from the listening position as the Left & Right front monitors. Read more on the following pages.

ITU 775



- 1) If you want to fulfill the requirements of the standard ITU 775, you should either use the A-solution or the B-solution along with a Delay on the center monitor in order to achieve the same time of arrival from all monitors. Delay-time for each monitor can be adjusted using the optional AIR PC-IP Installers software.

PLACING THE MONITORS

Placement of monitors and acoustics do influence monitor sound. AIR series provides powerful tools to compensate for different placement. Below, please find a description of the most common monitor placements and appropriate compensation. Using material from the calibration CD together with the AIR placement compensation settings could help the interaction between the AIR monitor and acoustics the studio. In general we recommended consulting an acoustics expert for measurement and advanced adjustment and alignment. AIR PC-IP is an optional PC software package for advanced installers which, among other things, provides comprehensive EQ and Delay possibilities for each AIR monitor. For installations where flush mounting is considered, make sure to consult an expert.

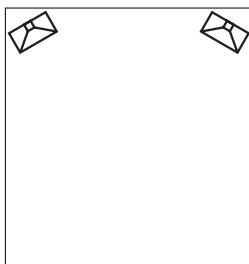
Free Standing



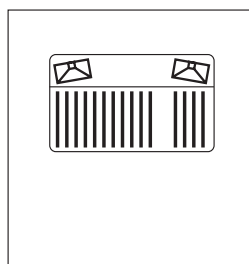
Wall



Corner



Console



Compensation tools within in the AIR System using the position options in the Calibration menu.

Free standing / "Neutral"

The monitor is placed on a stand or hung down from the ceiling some distance away from walls and other surfaces. This position requires the "Neutral" setting (which is default in the "Calibrate monitor" menu). Try to place the monitor optimally with regard to reflections and standing waves. This should be your reference - you can always try to compare performance of an optimally placed freestanding AIR monitor ("Neutral" in calibration menu) with any other monitors placed in other positions (Wall, Corner, Console) to determine if compensation in these positions is needed.

Close to wall / "Wall"

When the monitor is placed close to a wall, there is a need to decrease the bass response. The "Wall" setting found in the "Calibrate monitor" menu takes this and other things into account. Try to compare this setting with "Neutral" to determine which works better in your studio. If the opposite wall is parallel to the wall where the monitor is placed, be aware that low frequency cancellation might occur. Also, look out for standing waves which might occur due to an uneven distribution of low frequencies.

Corner

Same considerations as in the "Wall" position, but in a corner position there is even more need for decreasing bass response which will be boosted acoustically. Try the "Corner" setting found in the Calibrate monitor menu and then evaluate performance comparing with a freestanding monitor in "Neutral" position. Use the Bass and Treble filters for fine adjustment.

On the bridge / "Console"

Placing a monitor on a meter bridge of a console result in a strong single reflection from the surface on the desk which may color the sound (comb filtering - sounds like the sound is modulated). In general it helps to minimize the distance / height between the monitor and the reflective surface. Although it is not possible to eliminate comb filtering totally using EQ, try to select the "Console" setting in the Calibrate monitor menu and evaluate performance in your studio.

Other situations

In the Calibrate monitor menu, you will also find different settings which takes combinations of the above into account - e.g. Console Wall, which should be used if the monitor is placed both close to a wall and has a console reflection.

CHECKING - THE PLACEMENT OF THE MONITORS

Overview

- 1 In the Setup menu: Select setup type (e.g. 5.1 or stereo) matching your application
- 2 Check the phase (using the CD)
- 3 Check the monitor positions (using the CD)
- 4 Equalize the monitor (using the Bass and Treble parameters)
- 5 Go to: Calibrate monitor

Select correction

In the main display select Recall preset now you can choose from a number of possibilities depending on the way the monitors are positioned in the room:

Room positions can be selected via the menu:

Setup - Calibrate - Position

- | | |
|-----------|------------------|
| • Neutral | • Console |
| • Wall | • Console Wall |
| • Corner | • Console Corner |

- Select the one that matches your case.
- Select Volume in the main menu to leave preset menu.
- Set the volume: -10 dB
- Test signals on CD. With the AIR monitors you received a CD containing a lot of useful test signals to be used for setting up of the monitors.

Phase checking

First procedure to be carried out is phase checking. A number of signals both for two-channel stereo and for multi channel reproduction are provided with the CD.

Two channel stereo:

Use track 45-49. L/R signals are presented in phase and subsequently out of phase.

Multichannel:

Use the tracks 45-64 which contains DTS encoded signals pairwise comparable: L/R, L/C, L/LS, R/RS. If you do not have a DTS-decoder you may do the routing of the stereo L/R signals to other channels in your mixing console.

Checking by ear when listening to the signals:

In phase:

You will hear more bass and the sound coming from a fixed point between the monitors.

Out of phase:

You will hear the sound image loose bass, the sound image is diffuse, and the directional information is blurred.



If you already have a phase checking measurement system that can be used as well.

Checking the placing

When checking the placement of the monitors you first of all have to focus on the low frequencies. So the signals to be used are the low frequency sweeps as you find on the CD from track 31 to 39.

Low -frequency sweeps

The tracks 31 to 39 contains the following sweep sequences

Track 31: 200 Hz – 20 Hz
 Track 32: 160 Hz – 20 Hz
 Track 33: 125 Hz – 20 Hz
 Track 34: 100 Hz – 20 Hz
 Track 35: 80 Hz – 20 Hz
 Track 36: 63 Hz – 20 Hz
 Track 37: 50 Hz – 20 Hz
 Track 38: 40 Hz – 20 Hz

During the sweeps you will hear short “bleeps” telling when the signal passes one of the ISO center frequencies. (See tables in appendix)

There are two “bleeps” every time the frequency passes a whole octave center frequency and one “bleeb” every time the in-between 1/3-octave center frequencies are passed. Play all the tracks using only one monitor at a time.

Evaluation

In the listening position you should hear the signal smooth and even throughout all frequency sweeps (bearing in mind that the frequency response of the ear is not flat).

If you have a sound level meter this should be set to “LIN” with no frequency weighting. If the meter does not have a LIN position you can use the C-weighting, though the response is attenuated approximately 3 dB at 31.5 Hz and approximately 6 dB at 20 Hz.

In the background reading (page 41) you can find instructions on how alternatively to use a studio microphone if you do not have a sound level meter.

If OK; continue to next chapter: Calibrating the monitor setup. If not OK you must find new positions for the monitors.

You have to define at what frequency the response becomes bad. It is a frequency just above this you should select as the cross-over frequency between the main monitors and a subwoofer. If not possible to find any good positions for the main monitors or for the subwoofer you should consider changing the acoustics of the room. Equalization is a very common tool for the obtaining of a more smooth frequency response for steady state signals (like the sweeps). BUT remember: equalizing can never repair bad acoustics.

CHECKING - PLACEMENT OF THE MONITORS

Equalizing

The AIR System menu offers a two-band shelving type equalizer. This can be used individually on each monitor, and it is implemented for a fine adjustment of the tonal balance.

Range:	±6 dB
Adjustment step:	0.5 dB
Band I:	100 Hz - 1 kHz
Band II:	1 kHz - 5 kHz
Filter type:	Shelving

You should be very careful using this tool if you are doing the adjustment by ear. In a room with good acoustics equalizing should not be necessary at all.

As a test signal you can use full bandwidth pink noise (tracks 2 or 13) on the test-CD

In a room that you feel heavily over damped at higher frequencies you may wish to add some level in the high end in order to get the right balance. Do it with care then. In a highly reflective room you may wish to attenuate the high frequencies.

If you have made a good job placing the monitor in a proper position you should not touch the low frequency band.

Notice: If you have done any adjustments using the equalizer, you should leave the room and come back 15 minutes later bringing some music, that you know well. Play this music. Now your first impression is very important for the assessment of the tonal balance of the monitor system. Listening during a long time will make the hearing perform a change in the perceived timbre. This is what we can compare to the "white balance" of the eye. After a short time you are getting used to a new tonal balance or timbre. What sounds "cool" or "fat" then is not necessarily sounding right for monitoring purposes.



Additional Equalizing can be done via the optional PC-IP Installers Software.

PC-IP - Advanced Installers PC - Interface Packages

The Installers software includes a 4 band Parametric EQ, for more precise EQ adjustment of each monitor.

Next

Go to: Calibrating the main monitor set-up.

Read more in the Background Information chapter.

CALIBRATING - MAIN MONITORS

Overview

- 1 Select Setup menu from the Main menu
- then Calibrate monitor
- 2 Select each monitor and set calibration level
using the CD

Calibration procedure

The calibration has to be made to ensure that all monitors produce the same sound pressure level in the listening position when fed with the same signal.

The level of the input signal can be locked to a specific sound pressure produced by the monitors.

Interchannel calibration

In the main menu:

- Select Setup menu
- Then select Calibrate monitor
- Select monitor Master L front

Now you can read the settings of this monitor.

- Set the Calib to 0.0 dB
- Start the CD and play track 11/23 (two channel stereo) or track 11 (multi channel DTS)

The tracks contain 500 Hz – 2 kHz filtered Pink Noise.

Now: the sound pressure level is “measured” or registered by ear.

Continue to the next channel. Using the Calib adjust to set the same level as the first monitor. If using a multi channel set up continue to the next monitors.

Acoustic level calibration

In some parts of the audio industry the monitoring system has to be related to absolute acoustic levels.

On the CD, the tracks mentioned above are recorded at –20 dBFS. This level correspond to different acoustic levels depending on the kind of business you are in:

Film	Video	Music
83 dB(C)	78 dB(C)	78-93 dB(C)

- Select the first monitor (L).
- Play the track on the CD related to this monitor.
- Set Calib to 0.0 dB.
- Adjust the global volume until the desired C-weighted level is obtained on a sound level meter in the listening position.
- Go on to the next monitor
- Adjust Calib till the same C-weighted level is obtained from this monitor.
- Continue the procedure until all monitors are calibrated.
- Exit calibration.

Read more pages 38-39.

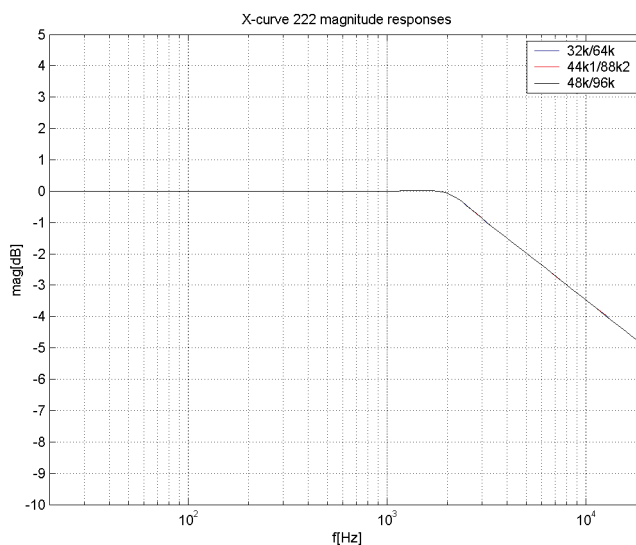
X-CURVES

For small rooms, defined as less than 5300 cubic feet or 150 cubic meters, ANSI/SMPTE 222M calls for a modification of the X-curve with flat natural response to 2 kHz and then a 1.5dB per octave roll off above 2 kHz.

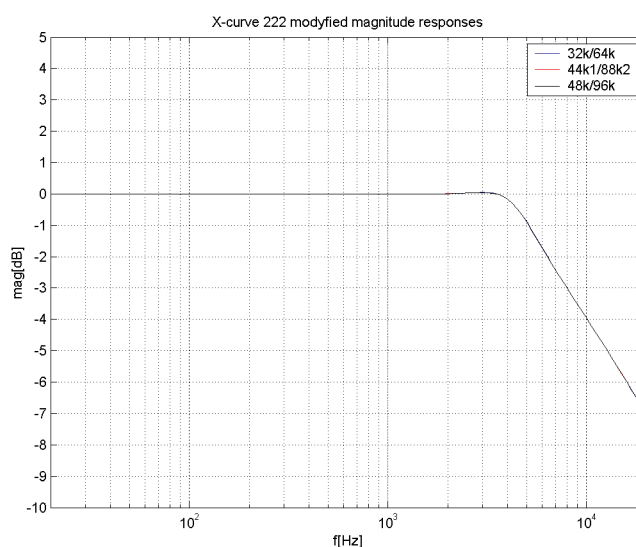
This curve is useful when mixing in a small room and be playing back in a large room.

Another variation on the curve is to begin the high end roll off at 4 kHz and roll off 3dB per octave instead of 1.5 per octave.

X-Curve 1



X-Curve 2



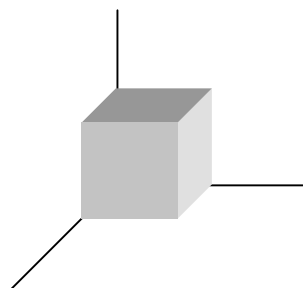
PLACING THE SUBWOOFER

Overview

Placement on the floor	Advantages	Disadvantages
In the corner	Gain of bass response	Excitation of most standing waves in the room, hence very uneven sound distribution
Adjacent to wall	Gain of bass response	Excitation of several standing waves in the room, hence very uneven sound distribution
Free standing	Position can be optimized with regard to standing waves	It may take up space on the floor

Floor standing

The subwoofer is under normal conditions always placed directly on the floor. This is taken into account in the basic design and the basic settings of the AIR system.

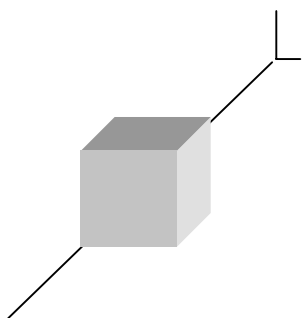


Placement in the corner

This is a $\pi/2$ radiation, which yields a gain of 18 dB in the frequency range where the monitor is considered to be omni-directional.

Most standing waves have their maximum in the corners of the room. Especially if the room has a cubic or shoebox shape (the room having all walls in parallel). The placing of the subwoofer in the corner may cause uneven sound distribution of the bass.

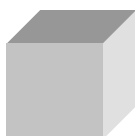
The corner position is normally only preferred if all opposite surfaces in the room are not in parallel.



Adjacent to a wall

This is a π radiation, which yield a gain of 12 dB in the frequency range where the monitor is considered to be omni-directional.

This position adjacent to a wall is commonly used, and it can be OK, but it must be noticed that the subwoofer should neither be placed in the middle or in the quarter points between two sidewalls if these are in parallel. (See pages 29-32 for the optimum positions with regard to standing waves.)



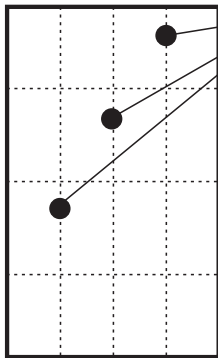
Free standing

This is a π radiation, which yield a gain of 6 dB in the frequency range where the monitor is considered to be omni-directional.

The free standing position is highly recommended in all cubic and shoebox shaped rooms.

In any case: Try to avoid placing the woofer on the half or quarter lines between walls.

CHECKING - SUBWOOFER PLACEMENT



Do not place the subwoofer on these lines quarter or halfway between walls.

Overview

- 1 **Main menu, set volume -20 dB**
- 2 **Main menu, select Bass Management: 120 Hz**
- 3 **Set Bass Management to "on"**
- 4 **Check the monitor position using the CD, tracks 30-44**
- 5 **Go to: Calibrating the subwoofer with the main system.**

Test signals on CD

With the monitors you received a CD containing a lot of useful test signals to be used for the set up of the monitors.

Low frequency sweeps

The tracks 30 to 37 contains the following sweep sequences

Track 31:	200 Hz - 20 Hz
Track 32:	160 Hz - 20 Hz
Track 33:	125 Hz - 20 Hz
Track 34:	100 Hz - 20 Hz
Track 35:	80 Hz - 20 Hz
Track 36:	63 Hz - 20 Hz
Track 37:	50 Hz - 20 Hz
Track 38:	40 Hz - 20 Hz
Track 39:	32 Hz - 20 Hz

During the sweeps you will hear short "bleeps" telling when the signal passes one of the ISO center frequencies. There are two "bleeps" every time the frequency passes a whole octave center frequency and one "bleeb" every time the in-between 1/3-octave center frequencies are passed.

Play all the tracks using only the subwoofer.
Mute all other monitors.

Evaluation

In the listening position you should hear the signal smooth and even throughout all frequency sweeps (bearing in mind that the frequency response of the ear is not flat).

If you have a sound level meter this should be set to "LIN" with no frequency weighting. If the meter does not have a LIN position you can use the C-weighting, though the response is attenuated approximately 3 dB at 31.5 Hz and approximately 6 dB at 20 Hz.

In the background reading (page 39) you can find instructions on how alternatively to use a studio microphone if you do not have a sound level meter.

If OK continue to next chapter: Calibrating the subwoofer with the main system.

If not OK you must find new positions for the subwoofer.

Next

Go to: Calibrating the subwoofer with the main system.

CALIBRATING THE SUBWOOFER - with the main monitors

Bass Management

Bass management (sometimes called bass redirection) is a very important and useful tool - and it is in general an absolute necessity if you want to make a 5-channel set-up in a small room! There are several reasons for this.

The bass management system is designed to subtract the bass contents of all main channels and reproduce this by the use of a sub woofer. The AIR-series provides a number of possible cross-over frequencies that can be determined by the user.

Checking summing phase cancellation

In a basic 2-channel set-up or 5-channel set-up (like the ITU-775) a sub-woofer is not specified and is not required. But making audio production to be played back on consumer equipment, one has to ensure that the mix will sound right in this situation. Many consumer set-ups containing a subwoofer. Hence it is very important to check what the summing of the bass is like. If the program material basically is out of phase, the bass will be cancelled when summed electrically. But this is not the case if the bass signals are reproduced by the main monitors and summed acoustically. A dramatic difference may exist!

Controlling standing waves

It can be very difficult to get two monitors in the right position in order to prevent the excitation of the standing waves. But placing five monitors are even more difficult! Each monitor should play under the same conditions as the others but that is seldom the case.

Three front monitors can normally be placed away from disturbing boundaries to prohibit the excitation of the standing waves. But in small rooms the rear monitors very often are placed in a corner or on a wall. Having the full frequency range reproduced in a monitor like that, there may occur serious problems which results in a poor low frequency sound distribution in the room.

So this is another reason for using bass management. Simply: Only one monitor - the sub woofer - has to be placed in a safe position. The cross over frequency can be selected to a value just above the problematic frequency range.

To Calibrate

- 1 Main menu, set volume -30 dB
- 2 Main menu, select Bass Management: 80 Hz
- 3 Main menu, select Setup menu: Calibrate level
- 4 Select a task for the monitor
- 5 Run CD low frequency sweeps; tracks 40-42
- 6 If needed: Adjust level or crossover frequency
- 7 Store and Exit / get ready for music!

Bass management on

The volume is set to a reasonable level (first item in main menu) ex -30 dB.

In the main menu Bass Management is selected. If no other preferences for a crossover frequency 80 Hz is selected.

If measurements or listening to the main monitors have indicated uneven level distribution or uneven frequency response at frequencies above 80 Hz, a higher crossover frequency should be selected.

Checking the Crosspoint

In order to confirm the selected crossover frequency, the CD is used. To be sure to listen to one monitor channel at a time one of the main channels are selected in the Setup menu/Calibrate monitor menu. For a start Master Left can be selected.

Playback the CD track containing the low frequency sweeps (trax 31 to 42). Listen to the response or perform sound level measurement if you have a meter connected.

If you have a spectrum analyzer you can instead play the CD-tracks containing full bandwidth pink noise.

Any uneven frequency response across the crossover frequency should be avoided.

You may go back to the setting of the crossover frequency in the bass management setup and select another frequency if appropriate.

After doing the adjustment on one channel, the other channels should be monitored one by one and finally all channels at one time.

Now your system is calibrated.

Read more on pages 25 - Phase Adjustment.
Also read page 37

Three other parameters to consider in relation to the subwoofer:

LFE Low Pass Filter

Switches On or Off a very steep (7th order) low pass filter at 120 Hz. When switched On, the LFE signal is filtered for content above 120 Hz. Switch this filter On when a media encoder is not in use and switch it Off when your signal have been through a media encoder / decoder (Most media encoders - DTS, Dolby etc. - employees an anti-aliasing low-pass filter. Therefor in a production environment it is important use this filter when monitoring the LFE channel in order to access how the signal will sound after encoding / decoding (in a domestic or cinema environment).

CALIBRATING THE SUBWOOFER - with the main monitors

LFE Gain

Range: 0 to +14dB

The LFE channel can be boosted up to 18dB using this parameter.

Polarity

Range: 0 or 180°

If the Subwoofer is correctly placed, setting the Polarity parameter at 180° should result in a full Phase cancellation at the set Cross-over frequency. If this is not the case - the Phase parameter described below should be adjusted.

Phase

Range: 0 to 180°

Phase Introduction

The integration of the AIR Base subwoofer with the AIR monitors requires on-location tuning. Apart from level calibration and choosing a Bass Management Crossover (X-over) frequency, the issue of phase alignment remains. For this purpose, the AIR Base has a 0-180 degree phase adjustment (in 5 degree steps) and a Phase Reverse function. The optimum setting of these will depend on several factors:

1. Room acoustics
2. Placement of monitors and listening position
3. Choice of X-over frequency
4. AIR Monitor type (6 or 15)



Phase settings are automatically saved and linked to the currently selected Cross-over frequency.

Phase settings are Global settings and are therefore not saved with individual presets.

Initial setting

During calibration of the AIR Base's DSP software, we have come up with default settings that we found optimal in **our** listening room. If you're placing the AIR Base at the same distance from the listening position as your AIR Monitors, the default phase settings can be used as initial guidelines for setting the phase. If the distances are significantly different, these values are not likely to be optimal.

Adjustment

Now play repeatedly a low-frequency sweep signal that sweeps over the X-over frequency that you have chosen. Tracks 31-42 on the AIR Test CD may be used. Between each sweep, change the Phase Reverse setting. Note the difference. Ideally, with the right level calibration and phase setting, the sound should cancel out and virtually disappear at or near the X-over frequency, when the Phase Reverse control is in one position. Tune Phase Adjust to get the largest possible difference between the two Phase Reverse settings. Then leave it in the position where no cancellation occurs.

Iteration

You may need to iterate quite a bit, maybe readjust the level calibration a bit too. You may even want to reconsider your initial choice of X-over frequency and/or monitor placement and start the process over again. Be patient: The time spent getting this right is well spent.

ACOUSTICS - BACKGROUND INFO

Acoustics

When we talk about making a room "sound right", we are probably dealing with room acoustics as a science acoustics has been around for about hundred years. Until then good acoustics happened by experiment, by experience, or simply by accident.

Today we know a lot about the parameters that influence the "sound" of a room.

Talking about the control room we know that basically this room should act as neutral as possible. But this is not always the case. Lets just take a short look on some of the issues, than one must be aware of.

Good acoustics

Here is a list of important parameters concerning good acoustics.

- Proper reverberation time
- Good sound distribution
- Adequate sound pressure level
- Low background noise level
- No echo (flutter echo)

Now lets have a look on these headlines that will be adequate for the most purposes concerning sound production.

Reverberation time

The reverberation time is defined by the time it takes a sound to attenuate 60 dB after the source is stopped. In the real life we can experience reverb times from approximately 0 sec. (outdoors or in anechoic chambers) to something like 10-12 sec. In special reverb chambers the time may exceed 20 sec.

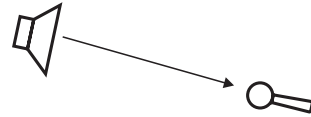
Control rooms normally should have a reverb time around 0.2 - 0.3 sec.

Why do we have reverberation? The speed of the propagating sound wave is very slow - at least compared to light: approx. 1130 ft. or 340 m per sec.

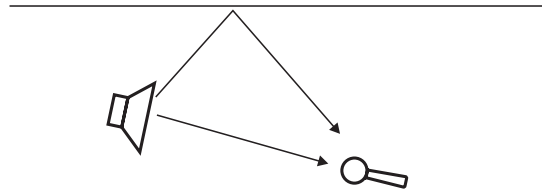
If there are no reflecting surfaces between the sound source and our ears, only the direct sound is heard and there is no reverberation.

If there is a single reflecting surface we may hear the reflected sound in one way or another, but there is still no reverberation.

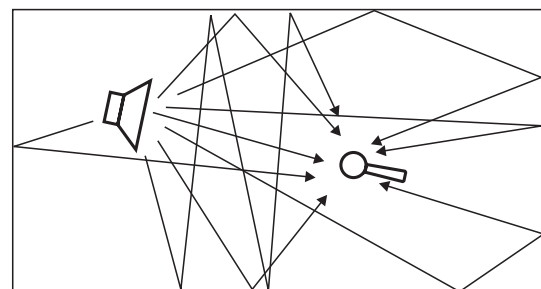
If the sound is generated in a room, there are a whole lot of reflections. Each of these travels different paths with different distances on the way to the receiver. Each time the sound hits a surface it may loose some energy if the surface is absorbing.



- One sound source, one receiver and no room
- Only the direct sound is received.



- One sound source, one receiver, and one reflecting surface.
- The sound is received twice. (In the control room this is normally experienced as comb filtering, see later).



- One sound source and one receiver in a room.
- The sound impulse is reflected in many surfaces. All the reflections are melting together and heard as reverberation.

ACOUSTICS - BACKGROUND INFO

Sabines formula

Sabine is the father of modern acoustics. He found that reverberation time is described by a relationship between the room size and the amount of absorption in the room. Larger rooms - longer reverberation. More absorption - shorter reverberation.

$$T = 0.161 \cdot V / A$$

where

T: Reverberation time in seconds
 V: Volume in m3
 A: Absorption in m2 Sabine
 0.161: Is a constant (to make the calculation right with the actual units)

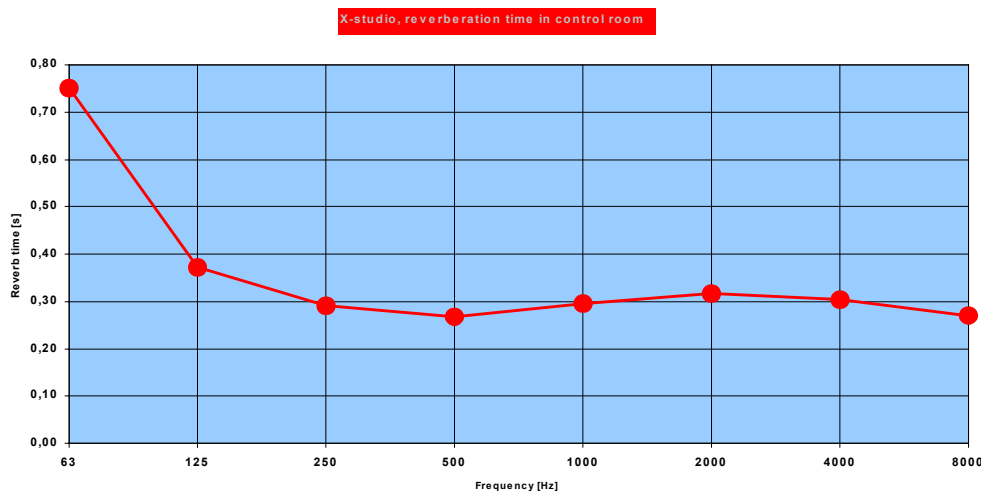


One square meter (1 m2) Sabine is comparable to an open window with an area of one square meter: The sound that hits the window will disappear and never return. One square meter Sabine is one square meter with full absorption.

The basic formula sounds simple, but the problem is that the materials in the room will absorb differently at different frequencies. The absorption may range from nothing (fully reflective) to total absorption.

A proper reverb time should be constant with frequency, but this is not always the case because of the behavior of the materials in the room. The low frequencies are the most difficult to control.

This is why the reverberation time against frequency in practice may look like this:



Reverberation time measured in a control room. From 250 Hz and above the curve is nicely placed around .3 sec. But below the reverb time rises to .75 sec. which is too much.

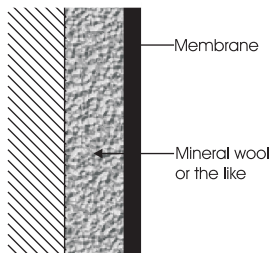
ACOUSTICS - BACKGROUND INFO

Absorbers

All materials in the room act acoustically even if they are not so-called acoustical materials. Basically we have three kinds of absorbers.

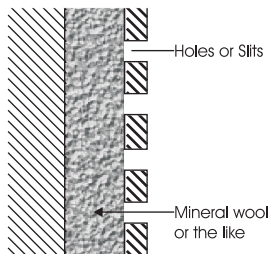
Membrane absorbers

This kind of absorber includes wooden floors, windows, doors, etc. This absorber provides absorption in the low end of the frequency range. The efficiency is normally not very high, but under normal conditions large areas are included in the basic room construction. Special designed membrane absorbers can be very effective.



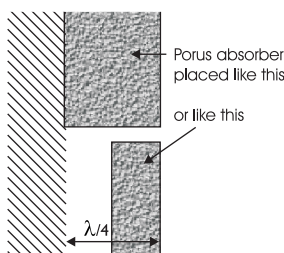
Resonance absorbers

Resonance absorbers include slit panels, perforated plate, Helmholtz resonators etc. These absorbers are normally used in the frequency midrange. The absorption is medium to high.



Porous absorbers

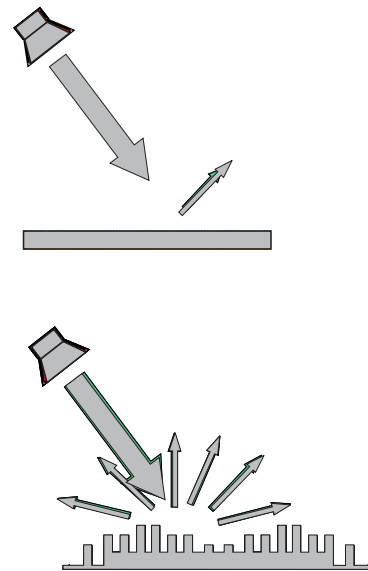
These absorbers include mineral wool, carpets, curtains, and so on. They can be very effective, but the thickness of the material has to be taken into account. Thin layers will only absorb the highest frequencies. (Think of a rehearsal room in the concrete basement where the only damping is a carpet on the floor: Not good at low frequencies!) To absorb a given frequency (and all frequencies above) the thickness of the absorber must be the quarter of the wavelength of that frequency. Or: the front of the material must be placed at a distance of one quarter of the wavelength.



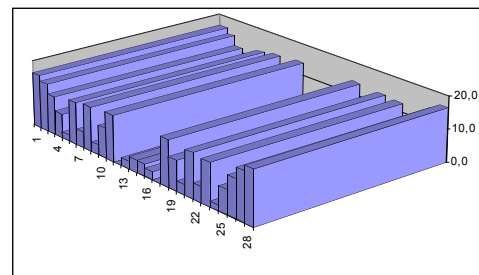
Diffusers

A diffuser provides diffuse reflection of the sound radiated against it. It can be a very useful solution in cases where reflections are disturbing the sound image and it is not advisory to add further absorption. So in order to reduce flutter echoes, comb filtering etc., special elements can be placed on the "disturbing" surface. These elements must have dimensions comparable to the frequencies at which diffusion is wanted.

Absorption or diffusion ?



A special technique developed by Manfred Schroeder is very capable in making a smooth and controlled diffusion. These diffusers normally referred to as "Schroeder Diffusers" can be found as prefab modules.



Cross section of one example of the Schroeder Panel.

BACKGROUND INFO - ACOUSTICS

Standing Waves

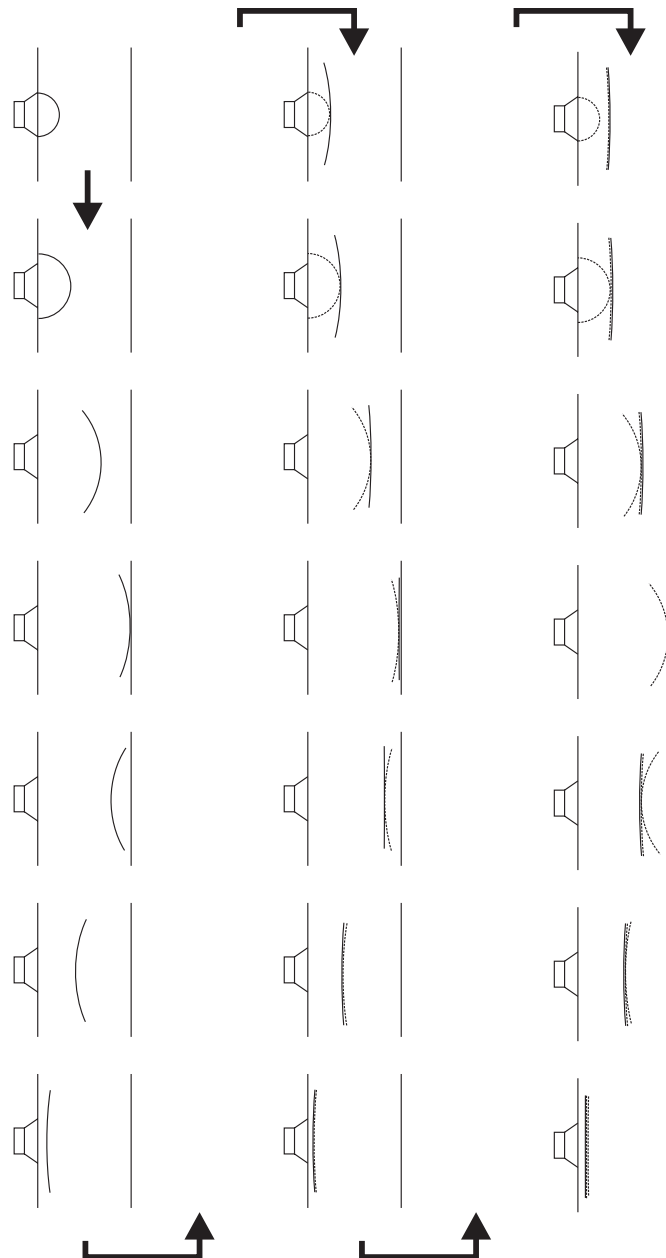
Standing waves exist in all kind of rooms. The shape of the room, the dimensions of the room, and the relationship between the dimensions of the room, are important parameters that will determine the frequencies around which the phenomenon exists as well as the distribution of these standing waves. But how do they occur?

Imagine a sound source. When the sound is emitted the sound wave will propagate in all directions if no obstacles in sight. This will of course happen with the speed of sound. Now, if the sound source is placed inside a room the sound wave will hit the boundaries of the room. If the boundaries consist of acoustically hard (reflective) surfaces, the sound is reflected. If the angle of incidence is

90° the sound will be reflected right back where it came from. Under certain circumstances the sound wave will meet itself again. For instance if the sound is reflected between two parallel walls. This becomes a problem, when the sound wave not only meets itself, but when it meets itself in phase. And this will happen when the distance between the walls is half a wavelength of the radiated sound wave. Or one whole wavelength - or $1\frac{1}{2}$, 2, $2\frac{1}{2}$ and so on.

This phenomenon is called standing waves. Actually the sound wave is not standing. But it is experienced like that because the sound pressure maxima and minima are positioned in fixed places in the room.

The sound field is initially radiated having a radial wave front but within a few reflections the sound field has obtained a plane wave front.

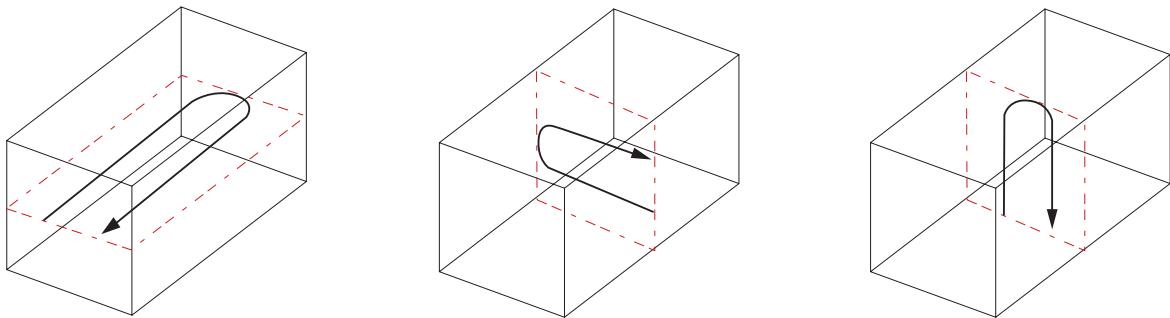


ACOUSTICS - BACKGROUND INFO

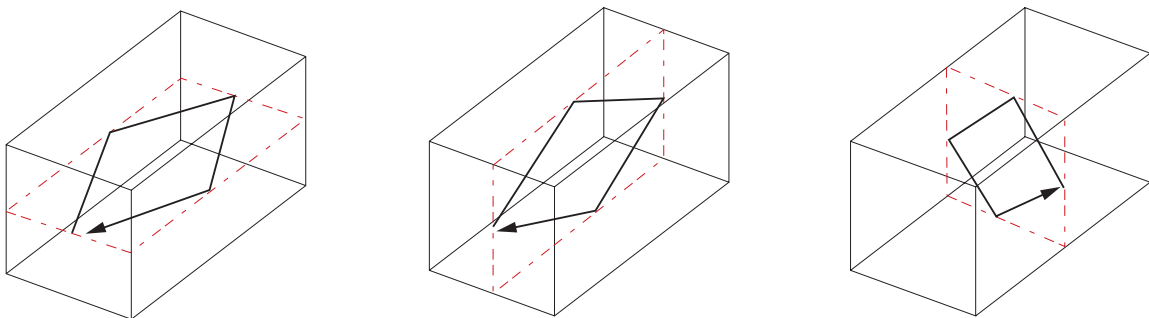
Room modes

These special frequencies are also called room modes. Standing waves between parallel walls are called axial modes. Other modes exist. For instance tangential and radial modes. (See the illustration). Normally the axial modes are the strongest.

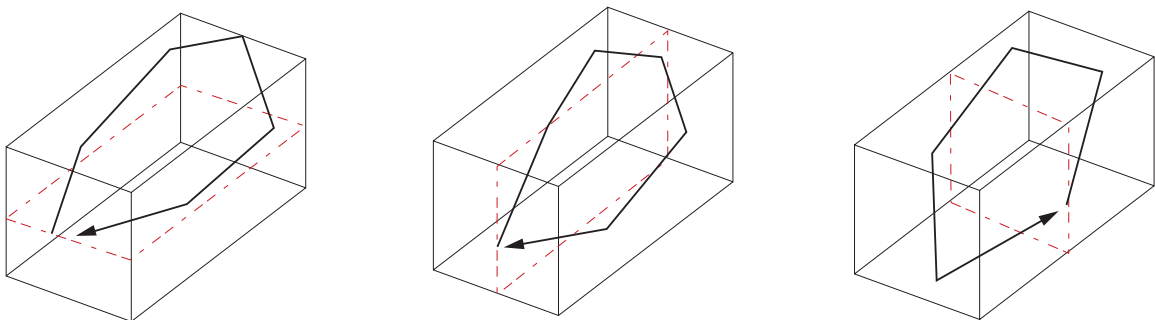
Axial



Tangential



Radial



ACOUSTICS - BACKGROUND INFO

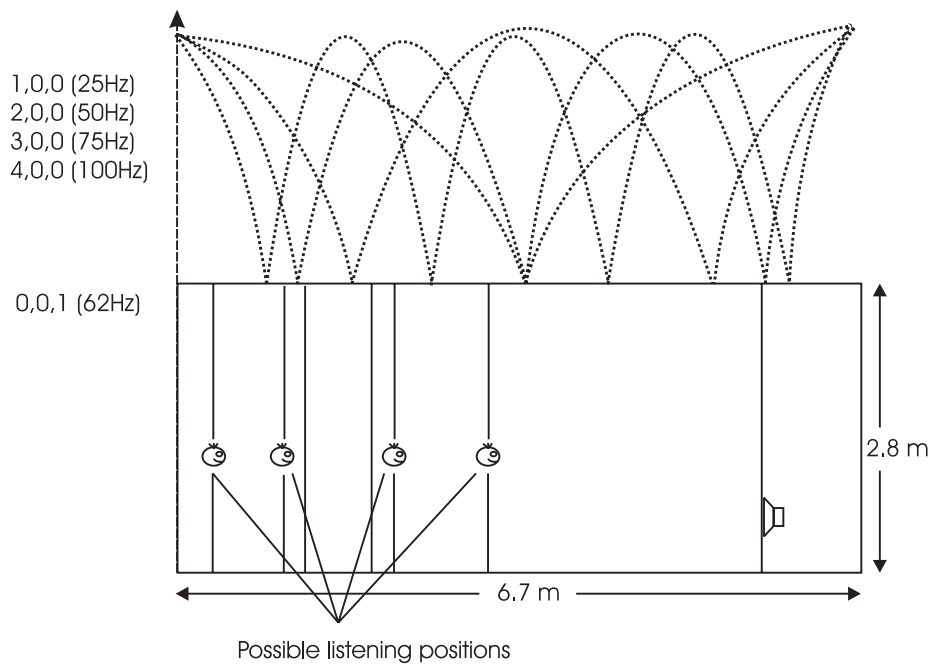
The standing waves are characterized by having a maximum sound pressure at the boundaries of the room. Depending on the frequency there are one or more dips across the room.

In a box shaped room the frequencies can be calculated as follows:

$$f = \frac{c}{2} \sqrt{\left(\frac{n_l}{l}\right)^2 + \left(\frac{n_b}{w}\right)^2 + \left(\frac{n_h}{h}\right)^2}$$

where

- f = frequency in Hz
- c = speed of sound (approx. 340 m/s or 1130 ft/s)
- l = length of the room
- w = width of the room
- h = height of the room
- n = integer from 0 and up



How does the standing waves influence the sound field?

The maxima of the standing waves are shown in the figure. The curve expresses the area of the room where the actual frequency is audible. At the minima the frequency is represented at a much lower level (sometimes -40 dB compared to the maximum).

If the room has the same dimensions as length, width, and even height it is very problematic to obtain an even sound distribution.

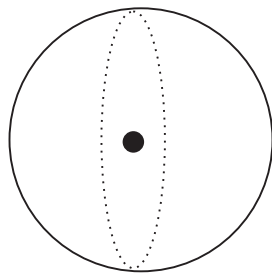
How to prohibit standing waves

Parallel walls in the room should be prevented. Then the strongest modes are suppressed.

When placing the monitors it is important that as few modes as possible are excited. This is why the monitors should not be placed in a maximum of a standing wave.

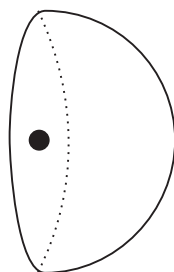
When monitors are built into walls you should therefore be concerned that the opposite wall is not parallel to the monitor wall.

ACOUSTICS - BACKGROUND INFO



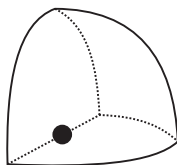
At low frequencies a monitor can be considered as to radiate the sound energy in all directions.

This is also called a 4π radiation.



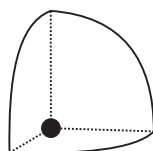
When placing the monitor close to a solid boundary - for instance a wall - the sound energy that should have been radiated in the direction of the wall instead is radiated into the free half space. Hence the sound pressure is doubled in the half space, which yields +6 dB.

This is also called a 2π radiation.



Placing the monitor against two boundaries - for instance in a corner limited by two walls - it is now radiating to the quarter space. Now the sound pressure is doubled twice, which yields +12 dB.

This is also called a π radiation.



Placing the monitor against three boundaries - for instance in a corner limited by the floor and two walls - the sound is radiated into 1/8 of the space. Compared to free space, the sound pressure now is increased by 18 dB.

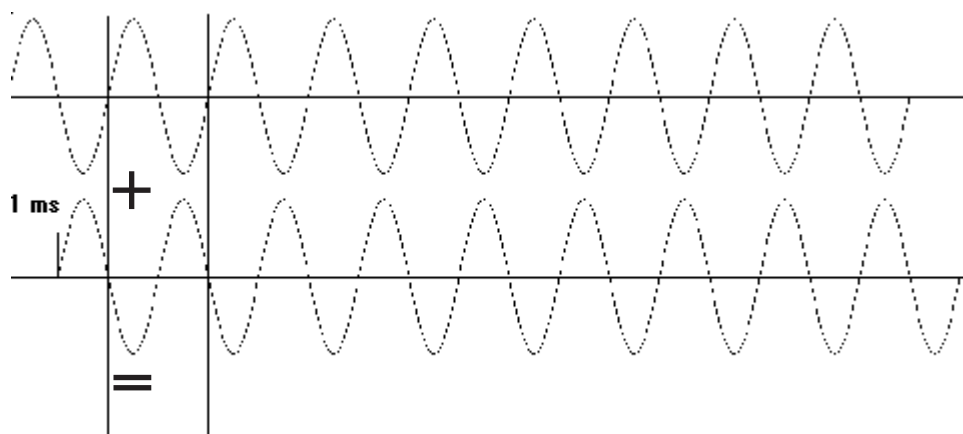
This is also called $\pi/2$ radiation.

In practice the placement close to boundaries will influence the frequency range below 125-150 Hz.

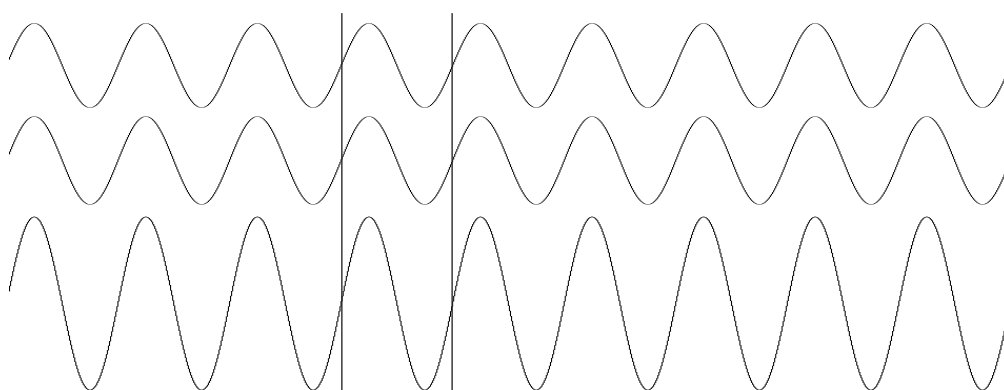
ACOUSTICS - BACKGROUND INFO

Comb Filtering

The filtering function that arises when a signal is added to itself after having been delayed in time is called a comb filter. The resulting frequency response resembles a comb, hence the name.



Two 500 Hz sinusoidal tones added. The second tone is delayed 1 ms hence the sum is zero

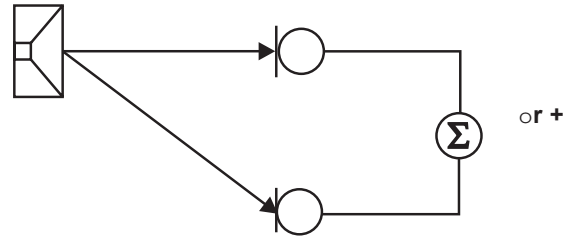
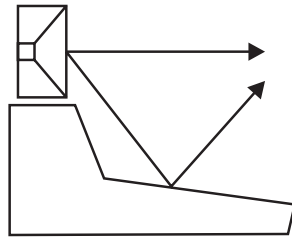


Two 1 kHz sinusoidal tones added. The second tone is delayed 1 ms hence the sum is the double (+6 dB).

The comb filter function is almost never intentional, but it is heard all the time in sound productions, where it can arise both acoustically and electrically.

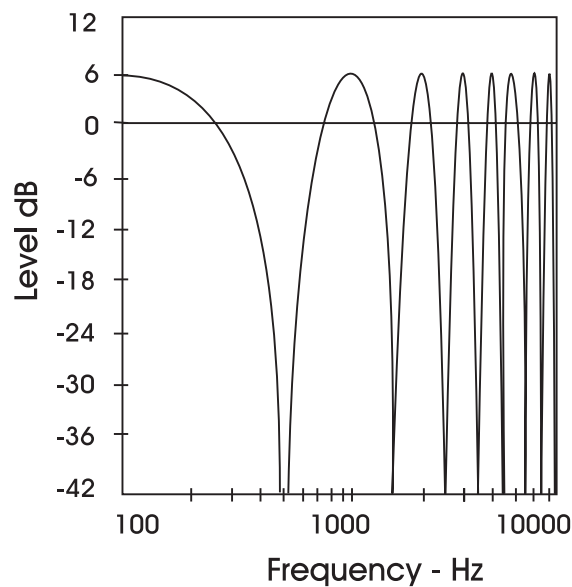
Acoustically, it typically occurs when the sound on its way from source to recipient takes in part a direct path and in part an indirect path via a single reflective surface. The reflection must be attenuated at least 10 dB and preferably 15 dB in order for it not to have an effect on the sound field at the recipient position. Electrically, the phenomenon arises when two microphones with a certain distance between them capture the same signal and the level from each microphone is of the same order of magnitude.

ACOUSTICS - BACKGROUND INFO



Two typical situations in which comb filters arise, either acoustically or electrically.

In general: All digital signal processing takes time. This means in practice that comb filter effects can arise if you loop a signal via, for example, a compressor and combine this signal with the original.



An example of a comb filter created by the combining of two signals with the same amplitude, but with a time delay between them of just 1 ms.

It can be seen that a dip occurs due to cancellation at 500 Hz, 1.5 kHz, 2.5 kHz, etc.

It can also be seen that the two signals add to double their value (+6 dB) at low frequencies and with a full wavelength's delay at 1 kHz, 2 kHz, 3 kHz etc.

Dip frequencies

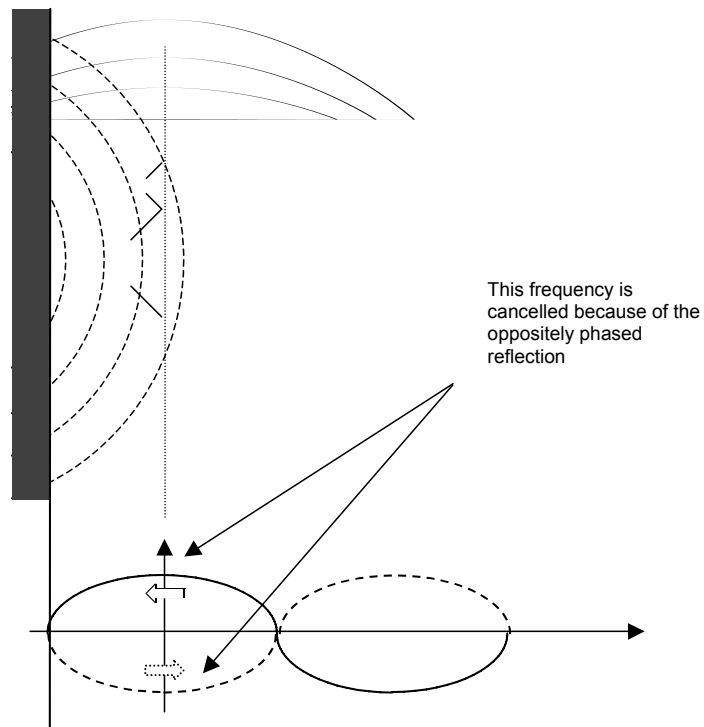
Cancellation occurs for a comb filter at all the frequencies where the two signals are in opposite phase. This occurs when the time delay comprises duration of $\frac{1}{2}$, $1\frac{1}{2}$, $2\frac{1}{2}$, etc. periods. At 1 kHz the period is 1 ms. Half of the period is 0.5 ms. If a time delay of precisely 0.5 ms occurs, it means that cancellation will arise, not just at 1 kHz, but also at 2 kHz, 3 kHz, 4 kHz etc.

ACOUSTICS - BACKGROUND INFO

Rear wall cancellation

When the monitor is set up at some distance in front of a wall, reflections from the wall may occur and influence the perceived frequency response. This could result in comb filtering if all frequencies produced by the monitor were radiated in all directions. But the monitors are typically only omni-directional at low frequencies.

The result of the reflection is a single or few dips in the frequency response perceived in front of the monitor.



The frequency response may look like this: one cancellation at the frequency that has a wave length of four times the distance to the rear wall.

The dip - or cancellation frequency - is dependent on the distance to the wall. If the distance is 1 m, the first dip frequency will occur at a frequency with a wavelength of 4 m.

$$\lambda = c / f$$

where

λ = wavelength [m] (or ft.)

c = speed of sound [m/sec] (or ft./sec.)

f = frequency [Hz]

Hence

$$4 = 344 / f$$

$$f = 86 \text{ Hz}$$

A closer position will result in a cancellation at a higher frequency. This is then limited by the frequency where the monitor becomes directional and does not radiate sound to the rear.

A farther position will result in cancellation at a lower frequency. This is limited by the distance being so long, that the reflected sound is attenuated due to the long extra path travel.

THE SUBWOOFER - BACKGROUND INFO

The Subwoofer

A subwoofer is a monitor that reproduces low frequencies. The purpose is to take over from the main monitor(s) as frequencies approach the lower end of the frequency range. I.e. approximately below 120 Hz. When used in professional monitor systems it is commonly preferred to use subwoofers below approximately 80 Hz. But of course it depends on the performance of the main monitors.

The low frequency contents of just one or all the main channels can be directed to one subwoofer.

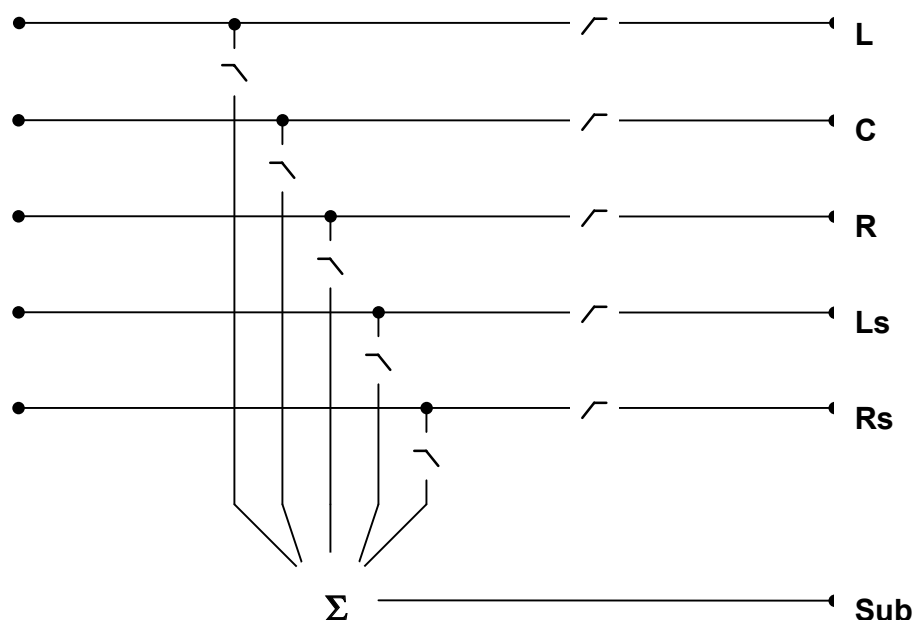
From the psycho-acoustics we know that there is no directional information in audio signals below approximately 120 Hz. Hence the advantage of placing the subwoofer in a position where the best distribution is achieved.

However it is very important that the distortion in the subwoofer is reduced to an absolute minimum because distortion results in the production of harmonics (2, 3, 4 etc. times the frequency reproduced). Especially the third harmonic may dominate. Reproducing a frequency of 100 Hz can result in the generating of an audible frequency component at 300 Hz, which presents directional information to the human hearing system.

Bass management

Bass management (sometimes called bass redirection) is a very important feature - and it is in general an absolute necessity if you want to make a 5-channel set-up in a small room! There are several reasons for this.

The bass management system is designed to subtract the bass contents of all main channels and reproduce this by the use of a sub woofer. The AIR-series provides a number of possible cross-over frequencies that can be determined by the user.



Principal set-up for the bass management. It can be used with any number of main monitors up to five.

THE SUBWOOFER & LFE CHANNEL - BACKGROUND INFO

Checking summing phase cancellation

In a basic 2-channel set-up or 5-channel set-up (like the ITU-775) a sub-woofer is not specified and is not required. But making audio production to be played back on consumer equipment, one has to ensure that the mix will sound right in this situation. Many consumer set-ups provide a sub woofer. Hence it is very important to check what the summing of the bass is like. If the program material basically is out of phase, the bass will be cancelled when summed electrically. But this is not the case if the bass signals are reproduced by the main monitors and summed acoustically. A dramatic difference may exist!

Controlling standing waves

It can be very difficult to get two monitors in the right position in order to prevent the excitation of the standing waves. But placing five monitors are even more difficult! Each monitor should play under the same conditions as the others but that is seldom the case.

Three front monitors can normally be placed away from disturbing boundaries to prohibit the excitation of the standing waves. But in small rooms the rear monitors very often are placed in a corner or on a wall. Having the full frequency range reproduced in a monitor like that, there may occur serious problems which results in a poor low frequency sound distribution in the room.

So this is another reason for using bass management. Simply: Only one monitor - the sub woofer - has to be selected in a safe position. The cross-over frequency can be selected to a value just above the problematic frequency range.

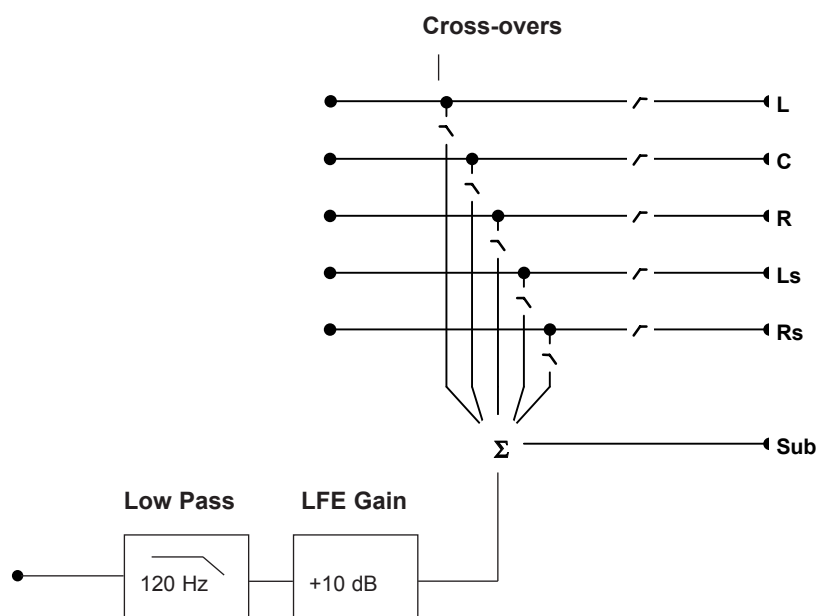
The LFE Channel

LFE is short for Low Frequency Enhancement or Low Frequency Effects, the first being the original name but the second being the most correct with regard to its application.

It is also referred to as the .1-channel, which indicates that the frequency range of this channel is only a fraction of the other channels in a multi channel setup. The actual frequency range is 20 Hz to 120 Hz.

When reproduced the signal is gained by 10 dB compared to the main channels. This provides a possibility of reproducing occasional high-level low frequency contents without affecting the general level setting of the main channels.

Leading signals to the LFE channel should be evaluated carefully in each case as not all transmission or reproduction systems may include this channel. In the music mix there is no special reason for using this channel unless you are recording the 1812 Overture with its canons and all that stuff.



DELAYING MONITORS

ITU 775

When using a 5.x set-up with monitors arranged on a circle line (as with ITU 775) the distance from the listener to each of the main monitors is the same.

In case of limited space the three front monitors can be arranged on a straight line. To compensate the center monitor being closer to the listener than the left and right monitor, the center signal can be delayed. To obtain coincident arrival of the sound from all front monitors the delay ranges normally between 0 and 3ms. dependent on the off-set needed.

The speed of sound is approximately 340 m/s or 1130 ft./s.

Approximately 1 ms. of delay will be used per 1 ft. or 30cm, when the monitor has to be "moved" backwards.

Cinema set-up

In the set-up for the cinema the front monitors are always arranged on a straight line. In this case the audience is placed closer to the surround monitors than the front monitor. In order to retain the directional information towards the screen the surround monitors are delayed. Normally the Haas-effect is taken into account. In the listening position the sound from the surround monitors will arrive about 15-20ms after the sound from the front monitors. The delay times involved with cinema processing for the surround channel is dependent on the size of the mixing facility, the cinema, or the home theatre/living room.

The procedure is to calculate the difference in distance between front monitors and the closest surround monitor. Then the time difference is calculated. To this is added 15-20ms.

Example: From a listening position there are 20 meters to the front monitors and 5 meters to the surround monitors. The difference is (20-5) 15 meters.

The time is $15/340$ sec, which equals .044 sec or 44ms. To this is added 15ms. The result is that the surround signal has to be delayed 59ms (or the closest possible).

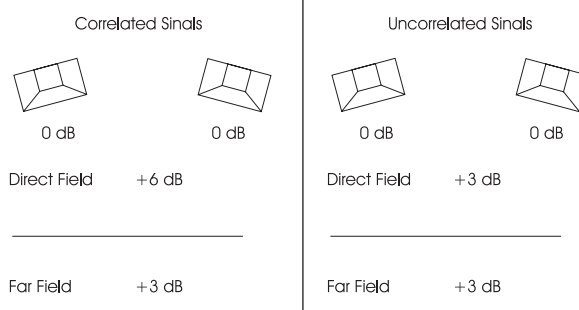
LINE-UP & CALIBRATION

Acoustic summation of audio signals

The total sound level in the acoustic summation of two sound sources, for example of two monitor monitors, depends upon both the signal and the acoustics. The sound sources can be correlated or uncorrelated.

The listening position (or measurement position) can be either in the direct sound field or in the diffuse sound field. In the direct sound field, there is only one sound direction. This direct field exists either in the open, in a reflection-free room or close to the monitors. The diffuse sound field occurs in a room when you are so far away from the monitors that the portion of direct sound is less than the sum of all the reflections. The distance from the monitors where the direct sound field and the diffuse sound field are equally large is called the critical distance. In a control room, it can typically be 1-3 meters. The near field in front of the monitors can be regarded as a direct field.

Based on all monitors in phase, the sum of the sound pressure from two monitors each playing at the same level is 3 dB, unless the signals are correlated (they are identical) and the sum is measured in the direct field. In this situation the resulting sound pressure level is 6dB higher than the level of the individual monitors.



Acoustic calibration of multi-channel systems

Calibration of the acoustic sound levels has been a requirement for many years when working with sound for film, although it has not been particularly common in other branches of the sound industry. However, with the widespread use of multi-channel formats for all forms of music and film presentation in the home, it has turned out to be beneficial to also have the acoustic levels under control here.

It is important to differentiate between production for the cinema and production for 5.1 channel reproduction in the home based upon ITU 775.

LINE-UP & CALIBRATION - BACKGROUND INFO

Calibration of 5.1 in an ITU-775 arrangement

In a 5.1 system based on the ITU arrangement, all main channels have in principle the same conditions: there is one monitor per channel and each is placed the same distance from the listener. Internationally, there is however neither agreement on the level nor on the bandwidth for the noise signals that is used for acoustic calibration. Pink noise is good since it includes all frequencies, however it is impractical due to its "unsettled" character, which makes it difficult to measure at low frequencies.

Surround Sound Forum

Surround Sound Forum is a German interest group composed of the VDT (sound technicians), the IRT and the SRT. The SSF has prepared guidelines, which are generally accepted in Europe. Three test signals are specified in it, which are recorded at -18 dBFS (RMS).

Measurement Signals			Listening Level		
Signal (only in one channel)	PPM level t < 0,1 ms	PPM level t < 10 ms	RMS level	Sound pressure level SLOW	Sound pressure level SLOW
	[dB]	[dB]	[dB]	[dB]	[dB(A)]
1 kHz sine	-18	-18	-18		
Pink noise 20 Hz-20 kHz	-9	-13	-18	82	78
Pink noise 200 Hz-20 kHz	-11	-15	-20	80	78

SMPTE

The corresponding standard from SMPTE (RP155) uses a standard of -20 dBFS for the reference level. Here, the C-weighted sound pressure level of a 500 to 2 kHz noise signal ends up at 83 dB.

Calibration of cinema systems

In a cinema, the listeners are sitting far from the monitors. Presumably, the majority sits in the diffuse sound field. In any event, attempts are made to establish a diffuse sound field from the surround monitors. Hence when the sound pressure is measured inside the cinema or in a mixing theatre it must be averaged over many different measurement locations. The typical basis for the majority of the standards is at least four locations. If there are different areas for the audience, for example main floor and balcony, measurement should be made in at least four locations in each. Before this measurement can be performed, the system's frequency response must also be in order.

How to measure the sound pressure?

Sound level meter or microphone

If you are used to perform acoustic measurements you probably already own a sound level meter. This can be used for the level calibration of the monitors.

If you do not have a sound level meter, there still is another possibility:

Take an omni-directional microphone. (This is also called a pressure microphone). A studio condenser microphone is normally preferred but the microphone must not be too big. Then a simple clip microphone can be used instead as it

does not influence the sound field. The microphone should have a flat frequency response.

Place the microphone on a stand positioned at the listening seat. Leave the microphone pointing upwards in order to avoid sound pressure build-up in front of the diaphragm and to provide equal conditions to monitors in all directions.

Connect the microphone to a mixing desk or a recording machine that has a meter built in.

Play back a track containing pink noise on the CD you got with the monitors. (or use one of the other tracks as instructed to during set-up and calibration.

Adjust the gain in the microphone channel until the meter deflection reaches a point 10 dB below full scale. This is now your reference for your measurements. Be sure that you have marks on the scale that makes it possible to read steps of 1 or 2 dB on either side of the reference deflection. If 10 dB below full scale is not an adequate point on your meter you may choose another one, just be sure to have a reading on a adequate resolution.

If you use this microphone set-up as described, it can be used for the level comparison between the individual monitors.

Absolute sound pressure levels can be measured if you:

- are using a well calibrated microphone channel
- know the sensitivity of the microphone.

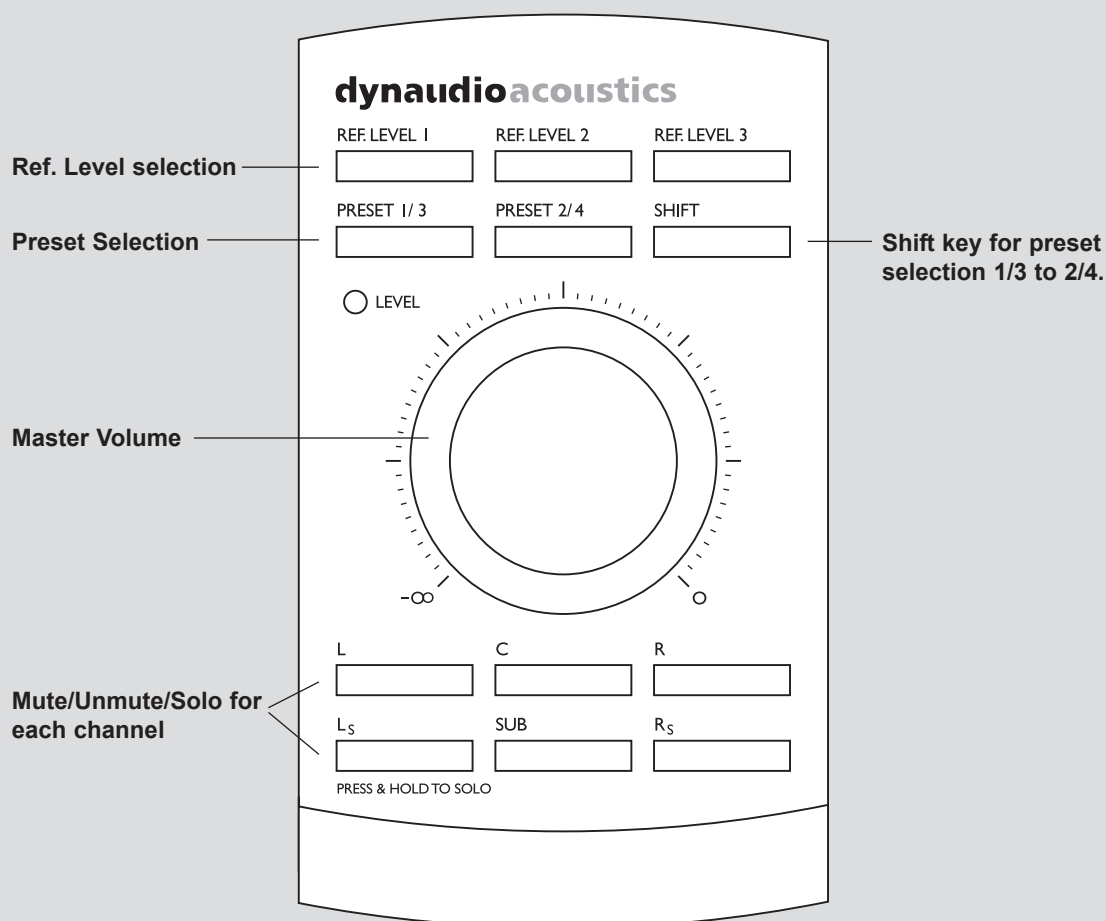
THE AIR REMOTE

Introduction

When perfect setup and calibrations is in place, optimal performance from the AIR system monitors is achieved by controlling level on the monitors themselves as opposed to controlling via the mixing console. Therefore a remote control is a natural extension to the AIR monitor system.

Remote Control Features

- Instant access of three different user defined Reference Level settings.
- Instant Preset Recall function of up to 4 presets. This way you can easily switch between different setups from your listening position.
- Mute/unmute and solo function for each monitor in the setup.
- Easy Master Level adjustment via large potentiometer.



THE AIR REMOTE

REF LEVEL 1-3 keys

To recall Reference Level 1-3:

Press relevant key shortly. The key LED indicates activated Reference Level.

To set Reference Level 1-3:

Set level using the large VOLUME dialer in the center of the remote. Press and hold relevant Reference level key for approx. 2 seconds. The LED will flash 3 times and then the new Reference level is set.

Power up state: Off (volume defined by potentiometer)

PRESET 1/3 AND 2/4 keys

These keys will recall presets 1/3 & 2/4 depending on the position of the SHIFT key.

Power up state: Off (no presets recalled).

SHIFT key

Combined with the PRESET 1/3 AND 2/4 keys (described above) presets 1 to 4 can be recalled.

Preset Bank 1 is presets 1 and 2. Preset bank 2 is presets 3 and 4.

Power up state: Preset Bank 1 selected.

MUTE/UNMUTE - SOLO keys for the channels:

L - C - R - Ls - SUB - Rs

The key LEDs indicates the following states:

LED ON	Speaker on
LED OFF	Speaker Mute
LED Flashing	Speaker Solo

Mute/Unmute

With a single press on these keys the monitors are muted/unmuted.

Solo Function

Press and hold one of the keys to activate Solo function for corresponding channel.

All other monitors can enter solo mode simultaneously.

If a key is pressed (not held) the original mute status will be recalled.

Power up state: On

VOLUME potentiometer

If no REFERENCE LEVEL keys are activated this control sets the Master volume on all channels in the system.

If one of the REFERENCE LEVEL keys are activated, these will define the reference level.

When REFERENCE LEVEL keys are deactivated Master volume returns to the level defined by the position of the VOLUME potentiometer.



Power up state: Potentiometer setting defines volume level.

Potentiometer LED function:

As soon as the volume level is defined by the potentiometer setting, the LED is on. LED goes off when volume is set by other devices than the remote unit.

Power up state: LED on (Potentiometer setting defines volume level).

AIR SOFT

The **AIR SOFT** is a software editor for the AIR System monitors. All parameters controllable via the display locally on the System Controller, as well as the Reference Level features available via the AIR Remote can be controlled via the AIR Soft program. As your AIR monitors most likely are placed out of your immediate reach we are therefore convinced that you will benefit from having full control over your monitor system from your PC or Mac.

Please find additional parameter explanations on pages 15-16 in this manual.

Minimum requirements

- PC Pentium 2 running Windows 95/98, 2000 or a Mac running OS 9.2 or higher (not OS X compatible)
- 64MB RAM
- 800x600 24bit screen resolution
- 1 free Serial port or USB.



Connect from Serial or USB port to any free TC LINK connection on your AIR monitors using **ONLY** the cables described on page 48. Serial to Cat-5 cable is supplied but if an USB port is used, an USB to Serial COM 9 port cable must be acquired.

Installation procedure PC:

- Place the Installation CD in your CD ROM drive and open CD contents.
- Press Setup
- Follow the instructions.

Installation procedure Mac:

- Enter the Installation CD in your CD ROM drive and open CD contents.
- Run the installer.
- Follow the instructions.

Navigating AIR SOFT

Network



Calibrate - Main Monitors



Main Screen



Press to enter preset list.

Calibrate - AIR Base



System Setup



AIR SOFT

Main



This is the Main screen from where all other AIR SOFT screens are accessed.

The ((•)) network icon (upper left corner)

If steady:

The computer running the AIR SOFT is not correctly connected to AIR monitors. Check connections, cables and refer to the setup-illustrations on pages 9-13 in this manual.

If blinking:

The computer is correctly connected to your AIR monitor system.

The ((•)) icon is also used to access the Network screen. Press ((•)) to access.

VOLUME dialer

Use the mouse on the VOLUME dialer on the middle of the display to adjust Volume

REF LEV. keys

The three keys below the dialer instantly switches between the 3 user-defined Reference level settings.

To change these Ref. Levels:

- Set dialer as desired
- Hold cursor above Ref. Level key and select "Store" from the pop-up icons appearing.

Monitor and Sub icons

Depending on the currently selected setup (if any) satellite monitors and subs will be indicated by appropriate icons as illustrated above. Press to access specific parameters for the monitors.



This symbol in the Main screen indicates that the selected setup expects a monitor at a certain position but no monitor is found. Check your connections and retry.

Bass Mgt - Bass Management

Indicates the selected Cross-over frequency for Bass Management.

Tools

When placing the cursor on top of a monitor, a few tools will appear:



- Press this symbol to enter calibration pages
- Press to solo the monitor
- Press to mute the monitor

AIR SOFT

Preset List

Is accessed by clicking on the left side of the display frame.



Presets include

- Preset Volume
- Bass Management
- LFE Low Pass
- Parametric EQ (can be adjusted the optional PC Installers Package only)
- Mute status
- X-curve setting
- LFE Gain

All other settings can be considered "global" and are not stored with presets.

Recall presets

Select preset using your mouse and press **Recall**.

Store presets

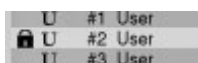
Select User preset loactions 1 to 15 and press **Store**.

Edit Name

Any User preset can be renamed.

Set cursor in the name field and edit name using your keyboard.

Locked symbol in Preset List



The "locked symbol" illustrated above indicates that the preset have been locked via the PC-IP Installers software. A protection-locked preset cannot be unlocked via AIR SOFT, - only via PC-IP.

OK

Press **OK** to exit window.

Network



Accessing the Network Screen

Press the (((•))) icon in the Main screen to access the Network facilities. In this screen various global network settings are handled.

Autodetect

Press to let the AIR SOFT scan your COM ports. If an AIR System is connected to any port it will be recognized. Please note that the Autodetect function is not executed until **OK** is pressed.

Port

Manual select of Serial/COM port.

Status

Indicates the status when entering the Network screen.

Clear Network - Clear Setup for entire network

Select this reset procedure to clear all tasks and setup settings.

Clear Settings - Clear Monitor Settings

All global and local parameters in connected monitors are reset. Preset and network settings are not affected.

Reset to Factory Settings - Reset All Settings

A "factory" reset procedure that deletes all global and local parameter settings as well as preset and network settings.

Upload Software to Monitors

Software updates for the AIR System comes as a .syx - file. There are separate files for monitors and subs.

- Save the .syx - file to a location on your harddrive prior to the upload procedure.
- Press **Upload Software to Monitors**
- Follow the instructions

AIR SOFT

During Software upload various messages could be displayed:

Example:

In a 5.1 AIR setup you are uploading monitor software to the entire system. As there are separate software files for monitors and subs the following message should appear.

"5 AIR monitors updated successfully"

- meaning the AIR monitors are updated but no software has been accepted by the connected sub.

If a monitor has lost connection during transfer it will not be counted but the software upload continues.

If the message: "Failed to update AIR monitors" - is displayed, some of the monitors have reported an error during software upload. This could be caused by communication errors. Please retry.

OK

Press to exit screen and execute Autodetect command if marked.

Monitor assignment

Task

- Press monitor symbol to activate pink noise test-tone.
- Then select task for the monitor now playing the noise. Serial number and type will be indicated.



A monitor marked with an exclamation mark indicates that an "unknown" monitor has been detected.



Scan System

Press the magnifying-glass to scan the entire system for connected units.

Save Settings

All settings except "preset settings" are saved to a back-up file.

Load Settings

Press and browse to select file to load. Follow the instructions.

System Setup



Configuration

Select your current setup.

Analog Gain

Range: 9dBu, 15dBu, 21dBu or 27dBu

Set to match analog Input gain to match the signal fed to the optional Analog Input card.

BNC Input

BNC Sync On:

The monitor attempts to lock on the Word Clock BNC.

Calibrate - Main Monitors



Mute

Solo

Pink Noise

Via the Calibrate screen, parameters and settings for the Main monitors are controlled.



The screen is accessed via the Main Screen by holding the cursor above the desired monitor and selecting the hammer icon.

Room position

Range: Neutral, Wall, Corner, Console, C. Wall or C. Corn
Select according to the actual position of the monitor.

X Curve

Range: Off, X-Curve 1 or X-Curve-2

Two modifications of X-222 curve are available. See page 21.

AIR SOFT

Calibrated Level

Level calibration of the selected monitor.

Relative Level

Preset volume for the selected monitor relative to the calibrated and global volume.

Use Parametric EQ

This will be marked if the Parametric EQ is activated via the PC-IP. Bass and Treble settings will be disabled.

Bass/Treble

Range: -6dB to +6dB

Bass and Treble adjustment for the selected monitor.

These handles are not available when the Parametric EQ is activated via PC-IP.



Mute

Press to mute the selected monitor.



Solo

Press to solo the selected monitor.



Pink Noise

Press to generate Pink Noise in the selected monitor.

Calibrate - AIR BASE



Mute

Solo

Pink Noise

Via this Calibrate screen, parameters and settings for the Subwoofers are controlled.



The screen is accessed via the Main Screen by holding the cursor above the desired Sub and selecting the hammer icon.

Phase

Range: 0-180°

To time-compensate if the Sub is not placed according to the ITU 775 recommendations. There are individual Phase settings for each of the Bass Management Cross-over frequencies. Once set, these are stored as Global settings.

Polarity

Range: 0 or 180 deg.

Mark to activate.

Calibrated Level

Level calibration of the selected monitor.

Relative Level

Preset volume for the selected monitor relative to the calibrated and global volume.

LFE Gain

Range: 0 to 14dB

With this parameter you can boost the gain of the LFE channel.

LFE Low Pass Filter

Mark to activate.



Mute

Press to mute the selected Sub.



Solo

Press to solo the selected Sub.



Pink Noise

Press to generate Pink Noise in the selected Sub.

Chained monitors

If several monitors are chained on the same task (e.g. LSur-LSChain) a dropdown menu will be present as illustrated below.

To calibrate a chained monitor simply select from the list.



Chained monitors will also be indicated in the Main screen.



This symbol indicates that there are two monitors chained on this specific position.

MISCELLANEOUS

The AIR series are unquestionably high quality products. This section puts focus on a few technical issues that adds to the perception of the products high standard.

High efficiency compact Switched Mode Power Supply (SMPS)

For saving overhead power consumption and to insure optimal performance disregarding the mains voltage, the unit is equipped with a high efficiency compact Switched Mode Power Supply (SMPS). Using switched technology both in amplifiers and power supply can reduce the heat sink size to about 1/3 the size of what it would be with regular power supply and class AB amplifiers.

Power saving shut down modes

The amplifier can detect whether or not there is Input on the analog or digital line. If input is absent for more than half an hour all monitors in a network will go to sleep-mode from which they can recover automatically when signal is received. The power up time from sleep is a few hundred ms.

If Input signal is absent for more than 2½ hours the system will go into standby from which it can recover by user intervention such as touching the volume wheel on the Remote Control or by touching the Master monitor display.

Software updates

Each monitor in a setup can be software updated via Network. This is done through PC/Mac using the AIR SOFT. Follow the Software update procedure as described on www.dynaudioacoustics.com

Reset Procedures

Three different levels of "Reset" exists. For all three scenarios all connected monitors will be affected.

The following Reset procedures are accessed by holding the ENTER key on the System Controller while powering up:

Clear Monitor Settings

All global and local parameters in connected monitors are reset. Preset and network settings are not affected.

Reset all Settings

A "factory" reset procedure that deletes all global and local parameter settings as well as preset and network settings.

The following reset procedure is found in the Setup menu:

Clear Setup for entire network

Select this reset procedure to clear all network settings.

Global Parameters

These parameters applies for the entire System:

Global parameters stored with presets

- Bass Management
- Mute Status

Global parameters NOT stored with presets

- Ref. Levels
- Analog Input Sensitivity
- Selected Setup
- BNC Sync

Local Parameters

These parameters applies for individual monitors:

Local parameters stored with presets

- X-Curve
- Parametric EQ setting (set via PC-IP)
- LFE Gain (subs)
- LFE Low Pass (subs)
- Rel. Level

Local parameters NOT stored with presets

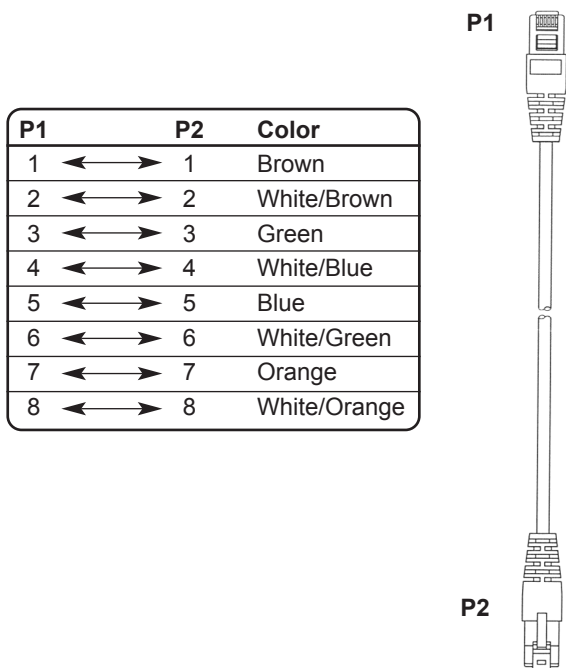
- Bass and Treble
- Delay
- Lock status (set via PC-IP)
- Room position
- Calibration Level
- Tasks
- Phase (Subs)
- Polarity (Subs)

CABLES

TC LINK Standard Cat-5 cables

Maximum Cable Length : 15 meter.
 Cable type : Shielded Ethernet Cable
 Category 5.
 Connector type : RJ45

This connection is carrying Digital audio (24 bit) and network control information.

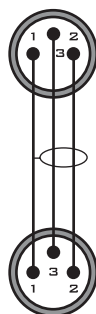


AES/EBU Standard cables

Maximum Cable Length: 100 m
 Cable type: 110 Ohm
 Connector type: XLR

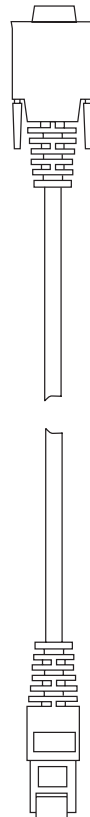
XLR - XLR

Pin 1 - Pin 1 (Ground)
 Pin 2 - Pin 2 (Hot)
 Pin 3 - Pin 3 (Cold)



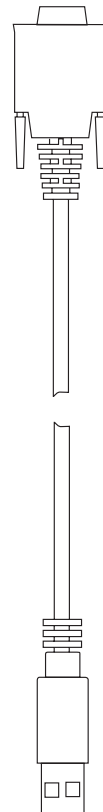
Serial to Cat-5 cable

- included with the AIR SOFT and PC-IP.
 This is a proprietary cable with build in electronics for use with AIR Systems only !



USB to COM 9pin

- NOT included with AIR SOFT or PC-IP.
 Use this type of converter in conjunction with the Cat5 to Serial cable described above if your computer has a USB connection only and no serial port.



AIR TECHNICAL SPECIFICATIONS

AIR 6 & AIR 15 (Master and Slave)

Model	AIR 6	AIR 15
System	Two-way Active Nearfield Monitor	Two-way Active Nearfield Monitor
Frequency response (+/- 3 dB)	40 Hz – 22 kHz	33 Hz – 22 kHz
Peak SPL 1m, pair (IEC Short Term)	> 128 dB peak	> 128 dB peak
Peak SPL 2m, 5.1 (IEC Short Term)	> 126 dB peak	> 126 dB peak (no LFE)
Max SPL 1m, (IEC Long Term)	104 dB RMS	103 dB RMS
Precision of monitor matching	+/- 0.2 dB	+/- 0.2 dB
Port tuning frequency	45 Hz	40 Hz
Internal cabinet volume	12.1 liters	27 liters
Bass principle	Bass reflex	Bass reflex
Crossover frequency	2150 Hz (DSP generated)	2150 Hz (DSP generated)
Crossover slope	24 dB/oct (Linkwitz Riley, DSP generated)	24 dB/oct (Linkwitz Riley, DSP generated)
Tweeter	Esotec 28 mm / 1.1" soft dome, rear chamber, magnetic fluid, 4mm die-cast alu front, pure alu wire voice coil	Esotec 28 mm / 1.1" soft dome, rear chamber, magnetic fluid, 4mm die-cast alu front, pure alu wire voice coil
Woofer	175 mm / 6.5", one-piece molded polyprop cone, 75 mm / 3" pure alu voice coil, magnetic shielded	240 mm / 10", one-piece molded polyprop cone, 100 mm / 4" pure alu voice coil
Mains voltage	100 to 240 VAC, 50 to 60 Hz (auto-select)	100 to 240 VAC, 50 to 60 Hz (auto-select)
Power consumption	40 W @ 1/8 max power (IEC 60065)	40 W @ 1/8 max power (IEC 60065)
Finish		
Amp	Black anodized aluminum back plate	Black anodized aluminum back plate
Cabinet	Dark gray MDF baffle, Silver foil	Dark gray MDF baffle, Silver foil
Dimensions (H x W x D)	338 x 216 x 345mm / 13,3" x 8,5" x 13,6"	425 x 275 x 395mm / 16,7" x 10,8" x 15,5"
Weight	9.8 kg / 21.8 lbs	15.5 kg / 34.5 lbs
Amplifier		
Tweeter and woofer	Tweeter 200 W PWM amp/Woofer 200 W PWM amp	Tweeter 200 W PWM amp/Woofer 200 W PWM amp

AIR 20 & AIR 25 (Master and Slave)

Model	AIR 20	AIR 25
System	Three-way Semiactive Nearfield Monitor	Three-way Active Nearfield Monitor
Frequency response (+/- 3 dB)	31 Hz – 22 kHz: +/- 3dB	28 Hz – 22 kHz: +/- 3dB
Peak SPL 1m, pair (IEC Short Term)	131 dB peak	134 dB peak
Peak SPL 2m, 5.1 (IEC Short Term)	129 dB peak	132 dB peak
Max SPL 1m, (IEC Long Term)	104 dB RMS	107 dB RMS
Precision of monitor matching	+/- 0.2 dB	+/- 0.2 dB
Port tuning frequency	40 Hz	35 Hz
Internal cabinet volume	35 liters	68 liters
Bass principle	Bass reflex	Bass reflex
Crossover frequency	390 Hz (DSP generated) and 2600 Hz	400 Hz (DSP generated) and 2400 Hz (DSP generated)
Crossover slope	12 dB/oct and 6 dB/oct	
Tweeter	Esotar 28 mm / 1.1" soft dome, neodymium magnet, rear chamber, magnetic fluid, 4mm steel front, pure alu wire voice coil	Esotar 28 mm / 1.1" soft dome, neodymium magnet, rear chamber, magnetic fluid, 4mm steel front, pure alu wire voice coil
Midrange	145 mm / 5.5", one-piece molded polyprop cone, 38 mm / 1.5" pure alu voice coil	145 mm / 5.5", one-piece molded polyprop cone, 38 mm / 1.5" pure alu voice coil
Woofer	240 mm / 9.5", one-piece molded polyprop cone, 100 mm / 4" pure alu voice coil	2x240 mm / 9.5", one-piece molded polyprop cone, 100 mm / 4" pure alu voice coil
Mains voltage	100 to 240 VAC, 50 to 60 Hz (auto-select)	100 to 240 VAC, 50 to 60 Hz (select)
Power consumption	45 W @ 1/8 max power (IEC 60065)	45 W @ 1/8 max power (IEC 60065)
Finish		
Amp	Black painted back plate	Black painted back plate
Cabinet	Black ash with dark gray MDF baffle	Black ash with dark gray MDF baffle
Dimensions (H x W x D)	575 x 310 x 395 mm / 22,6" x 12,2" x 15,5"	510 x 535 x 450 mm / 20" x 21" x 17,7"
Depth incl. amp and driver:	435mm / 17,0"	490mm / 19,3"
Weight	28 kg / 62.2 lbs	46 kg / 101 lbs
Amplifier		
Tweeter, midrange and woofer	Tweeter & Midrange 200 W amp/Woofer 200 W amp	Tweeter 300 W amp/Midrange 300 W amp/Woofer 2x300 W amp

AIR TECHNICAL SPECIFICATIONS

AIR Base-1 & AIR Base-2

System:	Active Subwoofers
Total frequency response:	25 Hz – bssmng: 120 Hz, LFE: 2.5 kHz/ 23 Hz – bssmng: 120 Hz, LFE: 2.5 kHz : +/-3dB
Max. SPL 1m, one (IEC Short Term)	119 dB peak / 121 dB peak
Max. SPL 2m, 5.1 (IEC Short Term)	113 dB peak / 115 dB peak (no front, rear & center)
Precision of monitor matching:	+/- 0.2 dB
Port tuning frequency:	30 Hz / 27 Hz
Internal cabinet volume:	37 liters / 78 liters
Bass principle:	Bass reflex
Woofers:	1 / 2 pcs. 240 mm / 10", one-piece molded polyprop cone, 100 mm / 4" pure alu voice coil
Mains voltage:	100 to 240 VAC, 50 to 60 Hz (auto-select)
Power consumption:	40 W @ 1/8 max power (IEC 60065)
Finish	
Amp:	Black anodized aluminum back plate
Cabinet:	Dark gray MDF baffle, Silver foil
Dimensions (H x W x D):	310 x 480 x 420mm / 900 x 310 x 420mm (12.2" x 18.9" x 16.5" / 35.4" x 12.2" x 16.5") Depth incl. amp and driver: 447mm / 447mm (17.6" / 17.6")
Weight:	18 kg / 29 kg (39.6 lbs / 63.8 lbs)
Amplifier	250 W PWM amp

Room & Distance

<i>Typical listening distance</i>			
AIR 6	AIR 15	AIR 20	AIR 25
1.2-2 m / 4-7 ft	1.5-2.5 m / 5-8.5 ft	1.5-3 m / 5-10.2 ft	
<i>Typical room size</i>			
AIR 6	AIR 15	AIR 20	AIR 25
50-100 m ³ / 1600-3500 ft ³	75-125 m ³ / 2600-4400 ft ³	80-130 m ³ / 2800-4600 ft ³	
AIR Base-1	AIR Base-2	Two or three AIR Base-1's	Two or three AIR Base-1's
30-60 m ³ / 1000-2000 ft ³	50-100 m ³ / 1600-4400 ft ³	50-100 m ³ / 1600-3500 ft ³	75-125 m ³ / 2600-4400 ft ³

General specifications for AIR 6, AIR 15, AIR 20, AIR 25, AIR Base-1 & AIR Base-2

System sample rates	
Internal sample rate	192 and 176.4 via Dual Wire (optional Digital Card required) and 96, 88.2, 64, 48, 44.1 or 32 kHz
AIR Masters only	
I/O Connectors	XLR (2 channels AES/EBU in) 3 x RJ45 proprietary TC LINK
Formats	AES/EBU (24 bit)
Word clock input	BNC, 75 ohm, 0.6 to 10 Vpp
Display	2 x 16 character dot matrix
Operation	Menu system / four buttons
Analog input option	
Input connectors	XLR balanced (pin 2+, pin 3-)
Impedance	10/3 k Ohm (Balanced/unbalanced)
Selectable full scale input level	+9, +15, +21, +27 dBu
Dynamic Range	> 113 dB typ. (unweighted), BW: 20-20kHz
THD+N	< -105 dB typ. @ 1 kHz, -3 dBFS
Crosstalk	< -120 dB, 20 Hz to 20 kHz
A to D Conversion	24 bit (Dual bit delta sigma sampling at 4.1/5.6/6.1/6.1 MHz)
AIR Slaves only	
I/O Connectors	2 x RJ45 proprietary TC LINK

General for all Products

EMC complies with:	EN 55103-1 and EN 55103-2, FCC part 15 class B, CISPR 22 class B
Safety certified to:	IEC 60065, EN 60065, UL 6500 and CSA E60065 CSA FILE #LR108093
Environment operating Temperature:	32° F to 122° F (0° C to 50° C)
Storage Temperature:	-22° F to 167° F (-30° C to 70° C)
Humidity:	Max. 90 % non-condensing
Warranty	2 years on parts and labor

AIR TECHNICAL SPECIFICATIONS

AIR Remote specs

AIR Remote	
Finish:	Black anodized aluminum and plastic
Dimensions (D x W x H):	120 x 70 x 35 mm
Weight:	250g
I/O Connectors:	1 x RJ45 proprietary TC LINK
EMC	
Complies with:	EN 55103-1 and EN 55103-2,
	FCC part 15 class B, CISPR 22 class B
Safety	
Certified to:	IEC 60065, EN 60065, UL 6500 and CSA E60065
	CSA FILE #LR108093
Environment	
Operating Temperature:	32° F to 122° F (0° C to 50° C)
Storage Temperature:	-22° F to 167° F (-30° C to 70° C)
Humidity:	Max. 90 % non-condensing
Warranty	
Parts and labor:	1 year on parts and labor

DELAY IN SYSTEM & ERROR MESSAGES ETC.

Sample Rate		Digital Input			Analog Input *)		
(AES or WC In) kHz	Converter kHz	Samples @ Input Rate	msec	centimeter	Samples @ Converter Rate	msec	centimeter
32.00	64.00	93.00	2.91	100	73.00	1.14	39
44.10	88.20	68.00	1.54	53	73.00	0.83	28
48.00	96.00	40.00	0.83	29	73.00	0.76	26
64.00	64.00	34.00	0.53	18	73.00	1.14	39
88.20	88.20	34.00	0.39	13	73.00	0.83	28
96.00	96.00	34.00	0.35	12	73.00	0.76	26

*) : In Analog Input mode without WC Input selected, the system runs on the Master monitor's own 96kHz clock.

Error messages etc.

"!" as "96 kHz Center!"

The "!" indicates that the monitor is not connected to the network. The volume is then automatically set to -50 dB for the monitor not recognized.

"+" as "96 kHz L Front+":

The "+" indicates that the monitor you are looking at is the System Controller.

>> A-Input Lo <<

This is displayed in analog setups only and indicates that the Input level has been detected to be between -60dB and -20dB for a period longer than 3 minutes. This is a hint to turn up the Analog Input Gain

Analog Input gain range:

+9dBu, +15dBu, +21dBu or 27 dBu.

>> A-Input Hi <<

This is displayed in analog setups only and indicates that an Input level near 0dB is detected. (peaks in 2 sec. above -1 dB). This is a warning and you should turn down the

Analog Input gain range:

+9dBu, +15dBu, +21dBu or 27 dBu.

>> PSU error <<

Displayed if the power supplies fails. The power will be turned off and the monitor cannot operate. Contact the Service Department.

<Locked>

Displayed when a parameter is locked by the installer software and cannot be changed.

Parameter lock can only be unlocked with AIR IP software.

Standby

Displayed when no Input signal has been detected for more than 30 min. below -65 dB. The Amplifier is turned off. Standby mode is released as soon a signal level above -65dB has been detected.

>> Power save <<

Displayed when no signal has been detected on all monitors on network for more than 2½ hours. Power is turned off. Exit this mode by pressing any key on system controller or adjusting volume from remote.

CERTIFICATE OF CONFORMITY

Certificate Of Conformity

TC Electronic A/S, Sindalsvej 34, 8240 Risskov,
Denmark, hereby declares on own responsibility that
following products:

AIR 6
AIR 15
AIR 20
AIR 25
AIR BASE 1
AIR BASE 2
AIR REMOTE

- that are covered by this certificate and marked with
CE-label conforms with following standards:

EN 60065 (IEC 60065)	Safety requirements for mains operated electronic and related apparatus for household and similar general use
EN 55103-1	Product family standard for audio, video, audio-visual and entertainment lighting control apparatus for professional use. Part 1: Emission.
EN 55103-2	Product family standard for audio, video, audio-visual and entertainment lighting control apparatus for professional use. Part 2: Immunity.

With reference to regulations in following directives:
73/23/EEC, 89/336/EEC

Issued in Risskov, December 2002

Mads Peter Lübeck
Chief Executive Officer

PRESET LIST

#	Name		Preset Level (dB)										Bass M.	X-curve 1	X.Curve #2
1-15			Preset one to fifteen are "empty" until you choose to store something after which it says "User Preset"												
## Empty"/"			## User Preset"												
Factory Presets			Typical Applications										Bass M. X-over		
16	Neutral	All parameters neutral - a good starting point	L	C	R	Ls	Rs	SUB	LFE						
17	BassMgr ??Hz	Music, video and post for domestic (Not Cinema) use - Stereo, 5.1, 5.3 and 6.1	0	0	0	0	0	0	0	0dB gain	Off	Off	Off	Off	
18	BassMgr 80Hz	Music, video and post for domestic (Not Cinema) use - Stereo, 5.1, 5.3 and 6.1	0	0	0	0	0	0	0	0dB gain	50Hz	Off	Off	Off	
19	BassMgr 95Hz	Music, video and post for domestic (Not Cinema) use - Stereo, 5.1, 5.3 and 6.1	0	0	0	0	0	0	0	0dB gain	80Hz	Off	Off	Off	
20	BassMgr 110Hz	Music, video and post for domestic (Not Cinema) use - Stereo, 5.1, 5.3 and 6.1	0	0	0	0	0	0	0	0dB gain	95Hz	Off	Off	Off	
21	BassMgr 115Hz	Music, video and post for domestic (Not Cinema) use - Stereo, 5.1, 5.3 and 6.1	0	0	0	0	0	0	0	0dB gain	110Hz	Off	Off	Off	
22	BassMgr 120Hz	Music, video and post for domestic (Not Cinema) use - Stereo, 5.1, 5.3 and 6.1	0	0	0	0	0	0	0	0dB gain	115Hz	Off	Off	Off	
23	Cinema Flat	Mixing for Cinema without compensation for X-curve. 5.1	0	0	0	0	0	0	0	0dB gain	120Hz	Off	Off	Off	
24	Cine X-curve	Mixing for Cinema in a small room - compensates for X-curve. 5.1	0	0	0	-3	-3	0	0	0dB gain	Off	Off	Off	Off	
25	Cine X-curve2	Mixing for Cinema in a small room - compensates for modified X-curve. 5.1	0	0	0	-3	-3	0	0	0dB gain	Off	Yes	Off	Yes	
26	Cinema X+50Hz	Mixing for Cinema with small room X-curve compensation and bass Management.	0	0	0	-3	-3	0	0	0dB gain	80Hz	Yes	Off	Off	
27	Cinema X+80Hz	Mixing for Cinema with small room X-curve compensation and bass Management	0	0	0	-3	-3	0	0	0dB gain	80Hz	Yes	Off	Off	
28	CinemX+120Hz	Mixing for Cinema with small room X-curve compensation and bass Management	0	0	0	-3	-3	0	0	0dB gain	120Hz	Yes	Off	Off	
29	Cinema 80Hz	Mixing for Cinema with Bass management but without compensation for X-curve	0	0	0	-3	-3	0	0	0dB gain	80Hz	Off	Off	Off	
30	Cinema 120Hz	Mixing for Cinema with Bass management but without compensation for X-curve	0	0	0	-3	-3	0	0	0dB gain	120Hz	Off	Off	Off	
31	OB Van 120Hz	OB vans and very small rooms where rear-channels are close to sweetspot	0	0	0	-2	-2	0	0	0dB gain	120Hz	Off	Off	Off	
32	Neutral	All parameters neutral - a good starting point	0	0	0	0	0	0	0	0dB gain	Off	Off	Off	Off	

X-curve #1
X-curve #2
LFE Gain

ANSI / SMPTE222M (1.5dB roll off per oct. from 2kHz)) Please refer to page 25
 ANSI / SMPTE222M Mod. (3dB roll off per oct. from 4kHz) Please refer to page 25
 Please note that the LFE channel should be mixed with +10dB headroom.
 If you are not able to boost your LFE monitor output, you should add +10dB gain on your AIR-Base.
 Most format encoders / decoders take the LFE boost into account, meaning that you should leave the AIR-Base LFE gain at 0dB
 when playing back a DTS or DOLBY encoded material on your AIR system